THE PAPER INDUSTRY
and PAPER WORLD
AN EDUCATIONAL NEWS MAGAZINE—AUGUST, 1944

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PAPERMAKING COSTS
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THE PATTERSON FOUNDRY & MACHINE CO.
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President

Admir-able News for

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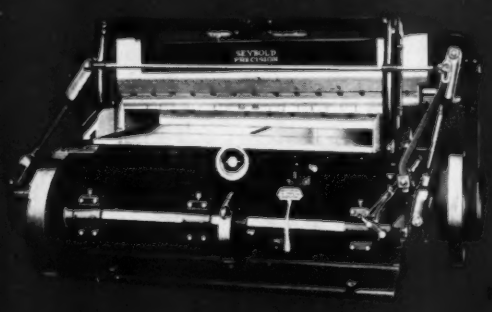
AN EASY WATCH, says Check-it. "Check clutch and brake adjustment carefully and thoroughly once every week."

BE ON THE LOOKOUT, flashes Inspect-it. "Every month be sure to see that clamp pressure mechanism is entirely okay."



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• DIVISION •

HARRIS-SEYBOLD-POTTER CO., 832 WASHINGTON ST., BOSTON, 7-7.

Sales and Service Representatives in all Principal Cities in the United States and Canada

Beloit Believes . . .
Beloit believes that among the freedoms Americans are fighting for is the freedom to think for themselves . . . and the freedom to make what they will of their own lives. Beloit believes that America's post-war future depends on the vigilance with which these American virtues are guarded. And Beloit believes that the American Way is the Free Enterprise way, the way America chooses to win its awards!
Buy War Bonds for Victory!
BELOIT IRON WORKS
PAPER MACHINERY
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SERVING UNCLE SAM
1ST
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BELOIT
BELOIT IRON WORKS, BELOIT, WIS.
WHEN YOU BUY BELOIT . . . YOU BUY MORE THAN A MACHINE!

1 oil does these 3 jobs better

than many special oils

THREE most frequent uses of oil in your plant—outside of power generating equipment—are probably in gear cases, air compressors, and hydraulic systems. As widely different as these three jobs may appear to be, one oil—Stanoil—has qualities that fit each use better than many special purpose oils. It offers these advantages:

1. It means one brand of oil to handle and keep in stock in place of three.

2. There is less chance for misapplication of lubricants with fewer oils from which the oiler must choose.

3. It simplifies procedure when oil is reclaimed or reused for other services.

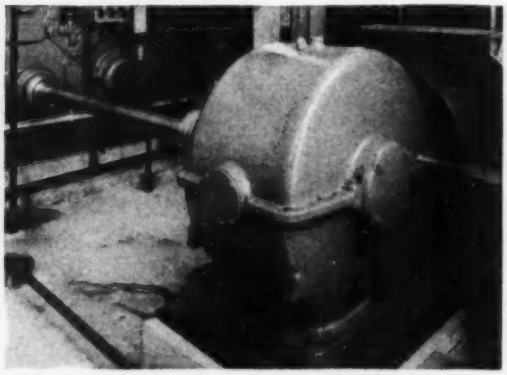
4. There is one convenient source of supply to contact.

These are *plus* advantages. In addition, Stanoil does an outstanding lubricating job wherever it applies. Let a Standard Oil Lubrication Engineer help you standardize your lubrication requirements by applying Stanoil wherever it can be used throughout your plant. Call your local Standard Oil Company (Indiana) office, or write 910 S. Michigan Avenue, Chicago 80, Illinois, for the Engineer nearest you. In Nebraska, write Standard Oil Company of Nebraska at Omaha 2.

STANOIL

Stanoil as a HYDRAULIC OIL

High viscosity index—an oil's ability to resist changes in viscosity with changes in temperature—is one of the qualities that recommend Stanoil for hydraulic systems. It flows readily at starting temperatures, yet it does not thin out excessively at high operating temperatures, thus providing more uniform operation. High stability against oxidation is another quality of Stanoil that adds to oil life. It prevents the formation of deposits that are so objectionable in hydraulic systems.



Stanoil as a GEAR CASE OIL

High stability of Stanoil is also an advantage in gear cases of speed reducers. Stanoil resists oxidation caused by agitation in the presence of air—a condition natural to speed reducer operation—and prevents the formation of deposits caused by oxidation. Low pour test is a quality of Stanoil which eliminates starting trouble where gear cases are exposed to low temperatures.

Stanoil as a COMPRESSOR OIL

The low carbon-forming tendencies of Stanoil are a great advantage in compressor lubrication. Oxygen in the air and heat generated by compression tend to oxidize oils in compressor service. Again Stanoil's high stability resists oxidation and reduces troublesome valve deposits.

Gasoline Powers the Attack . . . Don't Waste a Drop!

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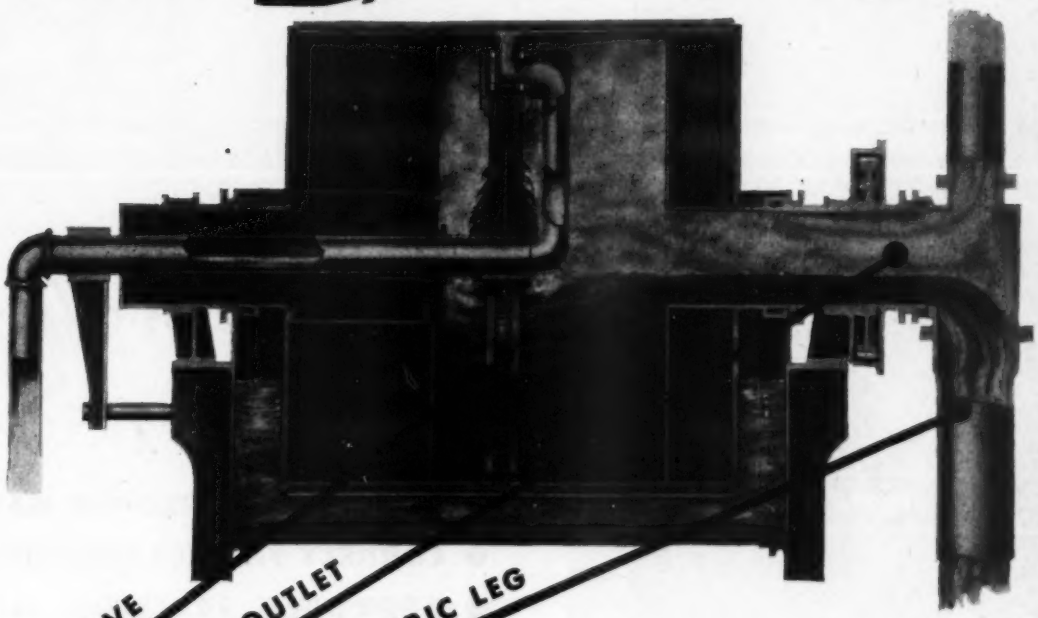
★ LUBRICATION ENGINEERING

OLIVER *Ringvalve* WASHER



Surplus Hydraulic Capacity • Desirable Tonnage Flexibility

Let's assume you have a production schedule calling for the washing of 200 tons of kraft per day. One of the several Oliver Ringvalve Washers will easily handle that tonnage.

Let's assume that periodically, the tonnage has to be stepped up to 250 or even 300 tons per day. What about the filter?

The same Oliver Ringvalve Washer as it stands will handle such an increase and with but little decrease in efficiency.

Because of its unique "ringvalve" and the large outlet, the filter has inherent surplus hydraulic capacity. It can take stepped up tonnages without jamming the works or producing a poor sheet.

When in the market for a black liquor washer, check among other things this question of "Tonnage Flexibility". You get it with the Oliver Ringvalve Washer . . . without the necessity of making any structural changes in the filter.

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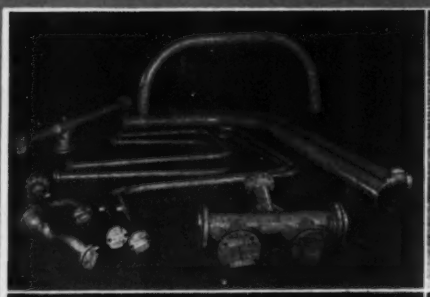
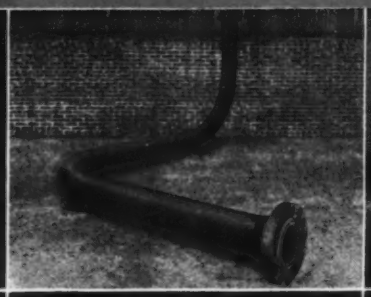
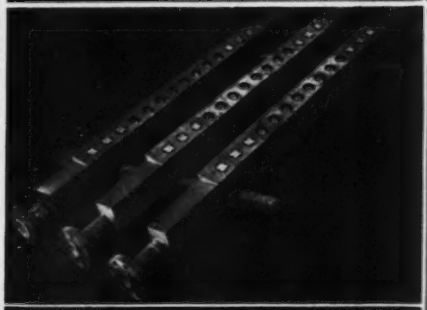


CHROME MOLYBDENUM



CARBON MOLYBDENUM

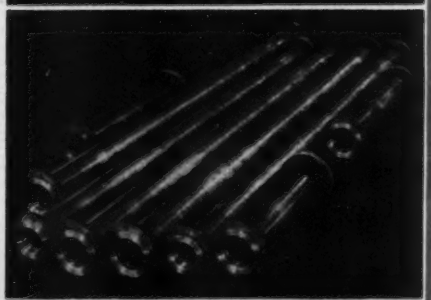
CARBON STEEL



FORGED STEEL

WROUGHT IRON

STAINLESS



COPPER

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- **SELECTION OF PROPER MATERIALS**
- **CORRECT FABRICATING TECHNIQUE**
- **APPROVED ERECTION METHODS**

FOR the correct fabrication of piping, varying techniques must be employed for different metals. Our more than forty years' successful experience in fabricating qualifies us to make helpful recommendations regarding the type of material best suited for your piping applications. This knowledge, coupled with complete facilities for correctly fabricating and installing single units or erecting complete assemblies assures fulfillment of your every piping requirement.

If you are planning alterations, improvements, replacements, or complete systems for central stations, paper mills, industrial and chemical plants, or other process industries, contact our nearest representative or write our Engineering Department direct. They will gladly make recommendations without obligation.

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and PAPER WORLD

- Serving the Industry Since 1919 -

Published monthly by

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59 E. Van Buren St., Chicago 5, Ill.

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THE PAPER INDUSTRY and PAPER WORLD is indexed regularly in *The Industrial Arts Index*. An index to each volume is issued annually by the publisher as Section Two of the April number.

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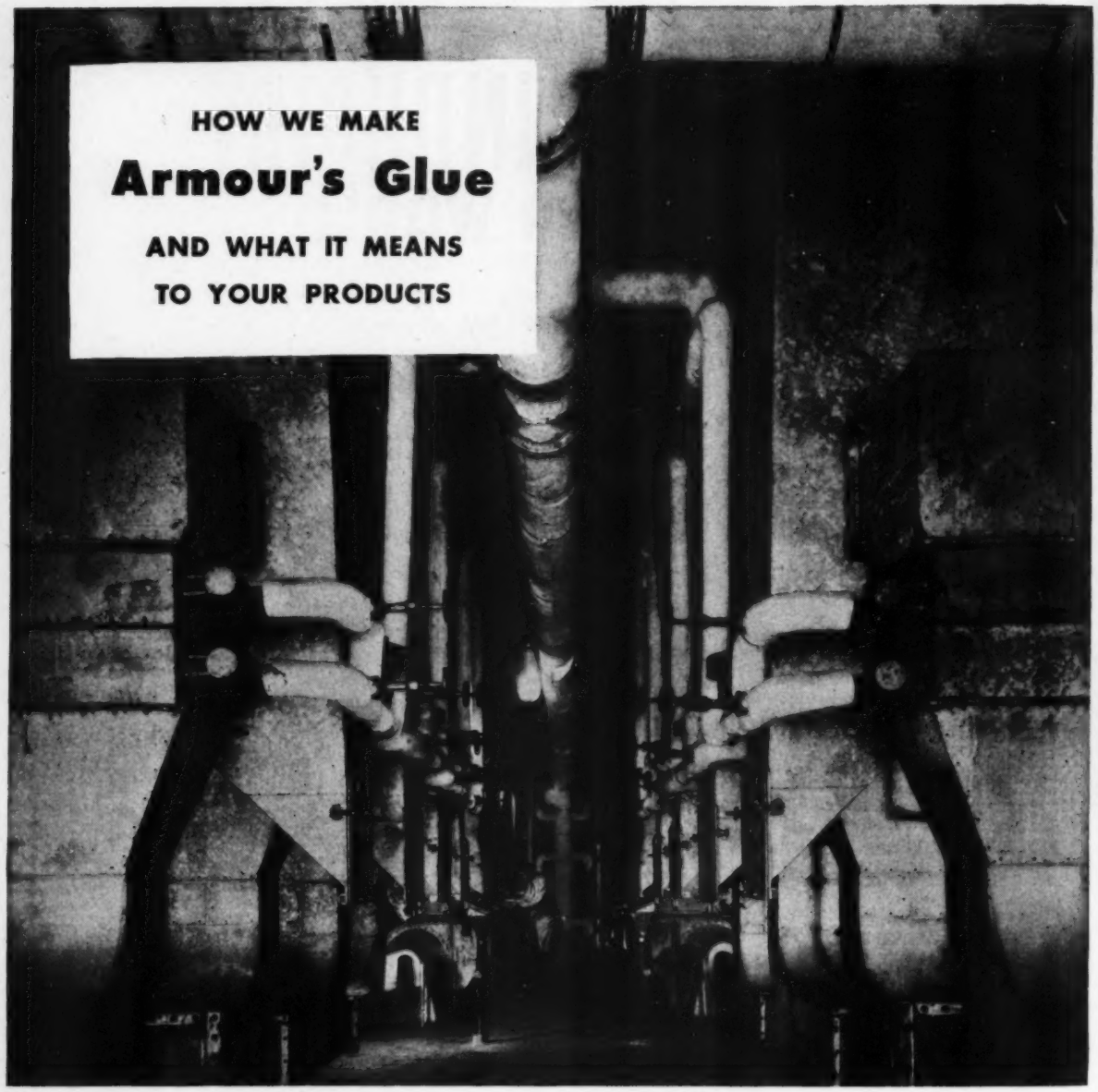
Entered as second class matter June 29, 1938, at the post office at Chicago, Ill., under the Act of March 3, 1879. Subscriptions in the United States, U. S. Possessions, Canada, Cuba and Mexico, $2.00 for one year, $3.00 for two years. All other countries $3.00 for one year, $5.00 for two years.



From these giant dryers comes Armour's famous animal glue!

This big battery of dryers is scientifically designed to utilize completely conditioned air. In other words, both the temperature and the humidity may be controlled at any predetermined value over a wide range for the required operating procedure.

Each dryer is *regulated precisely* to that set of conditions which insure perfect drying. For the glue entering the drying bins in a jelly-like state mustn't melt before it develops a protective skin.

Once this skin is formed, the temperature of the air in the system is raised gradually to create a higher moisture-carrying capacity. This is done for faster drying. Even the velocity of the air must be carefully controlled to prevent over or under-drying. And all these things are checked and double checked continuously while every batch is processed.

What does this drying process mean to your product?

It means glue of dependable uniformity, glue of unusual tensile strength, glue of great viscosity. In short, it assures you maximum performance.

Complex as this operation seems, it is simply *one small part* of the comprehensive and advanced array of technical controls which makes an Armour Glue the best for any use.

At present, the demand for certain grades of Armour's Glue is greater than the supply. And while we may be unable to send the exact grade you want, we'll be glad to discuss your problems with you with a view of helping you make *more efficient use* of glue that is available.

Size it best with Armour's

ARMOUR *Glue* DIVISION

Manufacturers of Hide Glue, Bone Glue, Flexible Glues, Soluble Dried Blood, Blood Albumin

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DE LAVAL WORM GEARS for Slow Motion!

Double-reduction worm gear for vertical drive; the driven shaft may extend up or down.

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De Laval double-reduction worm gears are made in ratios from 50 to 1 up to 8000 to 1.

A rigid cast iron housing maintains the worms and worm gear in perfect alignment, serves as an oil well, protects the working members from dirt and moisture, and eliminates danger to operatives.

There are only three working members, namely, the high-speed worm, the gear with which it engages and which is mounted upon the slow-speed worm, and the slow-speed gear and shaft.

The high-speed gear and the slow-speed worm dip in a reservoir of oil, lubricating all tooth and thread contact surfaces, while the ball bearings supporting both the high-speed and the slow-speed worms are immersed in oil. The slow-speed gear bearings are amply proportioned and effectively lubricated to withstand the considerable forces involved in a high-ratio reduction.

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1140

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FOOD for Fighting Men— protected by PAPER

"The finest food becomes useless", says Quartermaster General E. B. Gregory, "if the package which carries it fails to protect it."

To the Quartermaster Department global war brought countless new packaging problems. Such perishable supplies as flour, sugar, salt, rice, coffee, grains and dehydrated, moisture-thirsty vegetables must be kept in perfect condition—on desert sands, in arctic snowfields or steaming jungles. This calls for an infinite variety of specially devised containers.

The essential paper industry is meeting and solving these problems every day. Wax-dipped paper boxes, asphalt-sealed boxes, box-in-bag or bag-in-box types, the now well-known V1 and V2 paper shipping cases—these are some of the war-born packagings that are successfully meeting the hazards of global war.

KENWOOD WOOL PRODUCTS

F. C. Huyck & Sons is proud to be serving an industry so essential to the war program. Our skill, our facilities and our 74 years of experience are always available in solving the special felt problems created by urgent wartime paper needs.

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IMPROVE PIPING DESIGN • SAVE TIME • REDUCE COSTS

Qualified welders experienced on all kinds of piping report that Midwest Welding Fittings have exceptional dimensional accuracy and uniformity... saving time in layout because all pipe can be cut in advance according to drawings... saving time in lining up and welding... assuring more uniform welds.

Midwest originated and developed many of the fittings shown here: the "long tangent" elbows, saddles, sleeves, shaped nipples, and lap-joint stub ends with large radius and heavy forged lap. Midwest Saddles compensate for the weakening of header body resulting from the metal removed for neck opening; Midwest Sleeves relieve butt welds of any bending stress and much of tensile stress; Midwest Shaped Nipples eliminate all layout and templates when saddling one pipe upon another; etc. Get Bulletin WF-41 for complete information.

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ONE of these GATES V-Belts Will Fit ANY NEED You May Have!

Rayon Cord V-Belts
Static-Safety V-Belts
Special **Synthetic** V-Belts
Cotton Cord V-Belts
Steel Cable V-Belts

If you have a drive on which V-Belts of special construction may be required for greatest service efficiency, you will almost certainly find that Gates has long been building a V-Belt precisely engineered to fit your special needs.

On some installations, for example, a V-Belt, the tension member of which is composed of rayon cords will have advantages over the standard cotton cord construction. Gates has been building Rayon-Cord belts since 1939.

Again, Gates Rubber Engineers have found that a belt built with flexible steel cables as the tension member is sometimes most economical despite its higher initial cost—and Gates has been building flexible Steel-Cable V-Belts since 1935.

For more than six years, the Gates Synthetic Rubber belt has been making amazing service records in large industrial plants all over the United States. Under severe conditions of heat and oil the Gates special Synthetic belt actually wears 2 times to 3 times as long as any natural rubber belt ever used.

It might seem that it would be some trouble to determine whether a synthetic-rayon, a synthetic-steel-cable, or a standard Gates Vulco Rope would be most efficient and economical for your particular application. Actually, this involves no more than picking up your phone.

There is a Gates Rubber Engineer in every industrial center. A phone call will bring him to your plant. He is a specialist in drive operation. He is completely informed on the nature and advantages of every type of belt. He will always recommend the practice that will be most efficient and economical for you

***In one of the World's* LONGEST TUNNELS**

This big blower keeps the air clear in the 13.2 mile Alva B. Adams Tunnel which was "holed-thru" the Continental Divide on June 10. After firing a round, workmen may return to mucking immediately with the air free from smoke or powder fumes. On this big installation, the Gates RUBBER ENGINEER specified standard Vulco Ropes which have performed with splendid efficiency. 448

THE GATES RUBBER COMPANY

Engineering Offices and Stocks in All Large Industrial Centers

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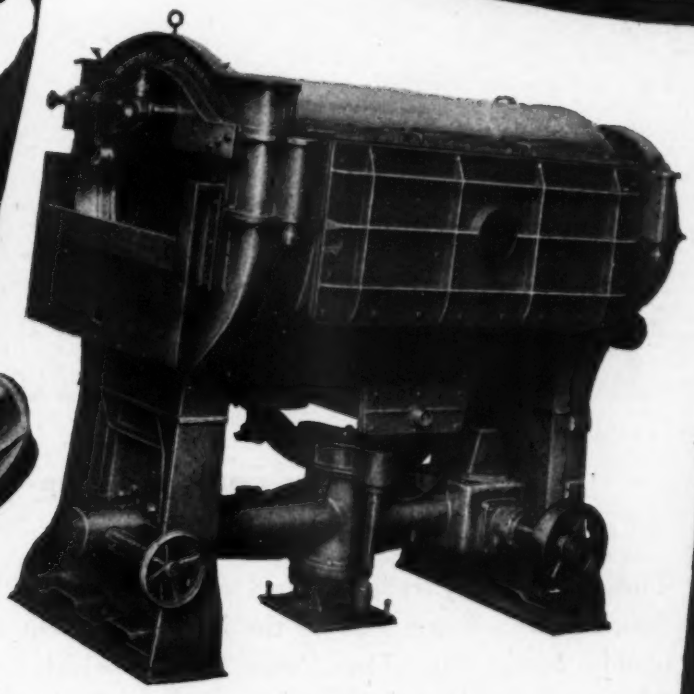
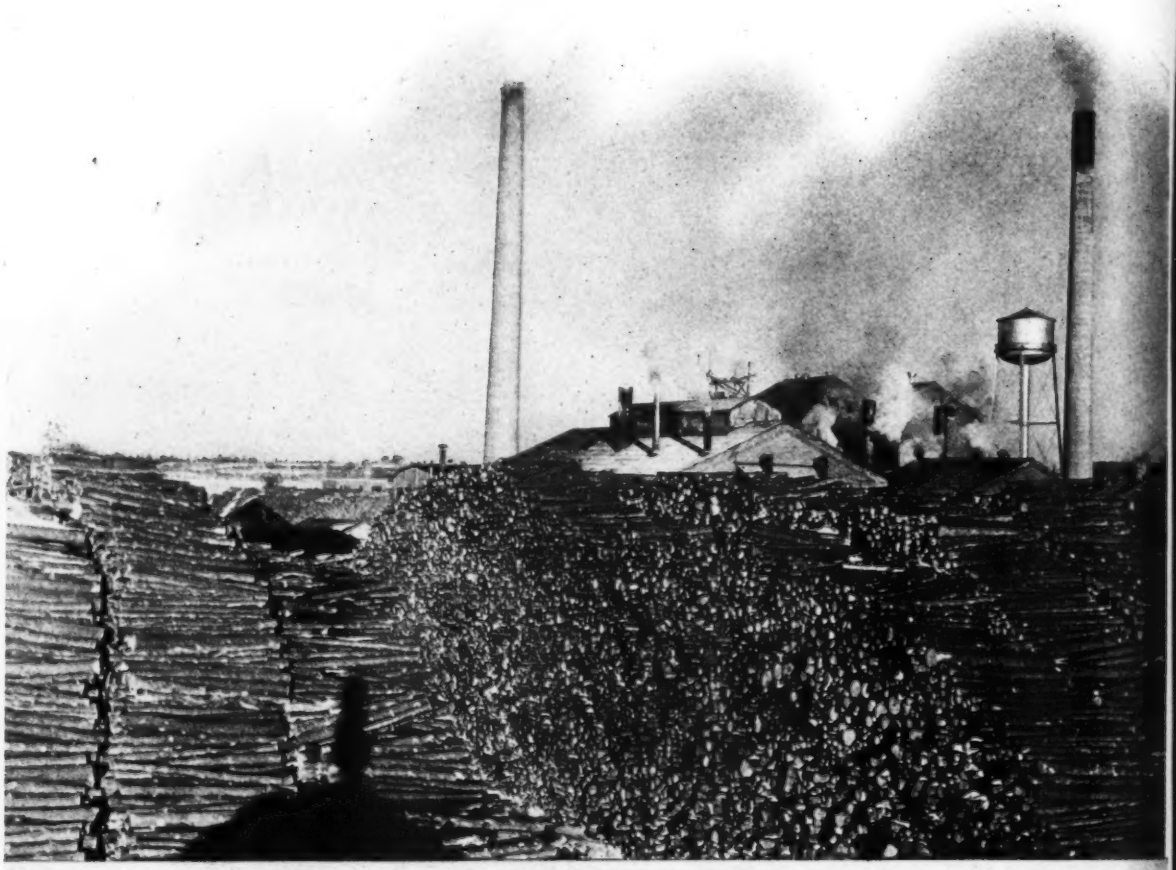


GEARED FOR WAR PRODUCTION

Jones

E.D. JONES & SONS COMPANY-PITTSFIELD, MASS.

Builders of Quality Machinery for Paper Mills



Victory Depends on the Home Front

Three top military leaders of the United States made a flying visit to the Normandy battlefront. They came back with a warning that the War is not yet won. They state that the speed with which our armies march to Berlin will depend in large measure on the support they get from the Home Front.

> "The battles now in progress entail heavy losses in material which American Industry must replace, and any slackening in the needed production will only delay ultimate Victory."

PULPWOOD is one of the most important of the materials of war upon which our fighting forces are depending. Production has been good this year, but it must be better to keep pace with war requirements.

We can speed the day of Victory by cutting all the pulpwood needed to keep military supplies and equipment flowing in unbroken convoys to the battlefields of France. We cannot fail at this crucial period without nullifying the sacrifices of the hundreds of American boys who gave their lives on the Normandy beaches. Many others will give *all* for Victory.

TRADE WINDS

☆

★ ★ ★ ★ ★ ★ Washington News ★ ★ ★ ★ ★ ★

Pulp and Paper Industry Council to the Department of Commerce

▶▶▶ E. W. TINKER, executive secretary of the American Paper and Pulp Association, recently announced an innovation in the way of Government-industry relationships.

The first meeting of a recently organized Pulp and Paper Council to the Department of Commerce was held in Washington on Wednesday, June 28, 1944.

The Council, established at the request of the American Paper and Pulp Association, is the first of its type. Its goal is a closer relationship, a better understanding, and a sounder mechanism for co-operation between Government and business. At the first meeting, industry members of the Council expressed the view that the Department of Commerce should be, to a large extent, the representative of the viewpoint of business and the Department with which business and industry, separately or collectively, could discuss their problems and the impact of governmental policies on those problems. It is hoped through this mechanism the viewpoint of the industry with respect to its welfare, will be considered in the formulation of Government policies.

While the Council is admittedly somewhat experimental, it is hoped that out of this approach there may develop proper co-operation between industry and Government and a mutual understanding of the problems of each, to the end that the industry shall make an ever-increasing contribution to the economy of the country.

It was recognized in the discussions on June 28 that immediately the Council should obtain an understanding in the industry of governmental processes and procedures, departmental and agency jurisdictions and relationships, in order that future consultations might be held in the light of the fullest knowledge of these matters on the part of the industry and in order that matters dealt with in such consultations might result in productive co-operation and harmonization of views. To that end a subcommittee, consisting of Roy K. Ferguson, Amor Hollingsworth, J. L. Riegel, and J. D. Zink, has been appointed to participate with members designated by the Department of Commerce in such discussions.

For the purpose of formalizing channels of communication, arrangements for meetings or presentation of industry viewpoints, E. W. Tinker, executive secretary of the American Paper and Pulp Association, will in the main, act as a liaison for the Committee. He will, on behalf of the Committee, arrange for the attendance of the full membership of the Committee when that seems desirable, and for the appointment of subcommittees and their attendance at meetings with respect to specific policies or industry viewpoints relating to them.

One matter that would seem to the Committee to be of immediate concern to the industry relates to the possible formation of international committees or commissions for the purpose of discussing and formulating policies with respect to the broad field of postwar international trade relations. It was recognized that such matters cover a very wide field and consideration was given to rumors, more or less specific, relative to Government discussions on such subjects. It was pointed out that in the past in matters of this kind foreign governments have sought advice and counsel from industries in their country and it may be assumed that they will do so in the future. Industry representatives indicated that when foreign trade discussions are initiated it would be very desirable that our government representatives, for obvious reasons, have similar access to the industries in this country beginning at the very initiation of such discussions. It was indicated further that it would be only fair that individual industries should be consulted before the selection of individuals as advisors from such industries. It was pointed out that in many industries it is only by consultation with the industry that there can be reasonable assurances that all viewpoints in the industry are represented in the selection of such advisors. The more complicated an industry is, the more necessary it seems to be that all viewpoints should have some measure of recognition.

It is hoped that out of such discussions there will grow a measure of co-operation that will be greater than anything heretofore achieved and that will be of great benefit to the country.

▶▶▶ HENRY G. BOON has given up his position as assistant director of the WPB Paper Division in order to resume his duties with the Kimberly-Clark Corporation, Neenah, Wisconsin. No successor has been named, but Rex W. Hovey, director of the

division, has stated that Mr. Boon will serve the division as a consultant when his services are required.

FURTHER RESTRICTIONS ON USERS OF PAPER

Increases in requirements of the Army and Navy for paper and paperboard have resulted in a still further tightening of the restrictions on supplies for civilian use. The reserve production quota device has been used to assure the filling of military needs, this procedure being the required withholding of certain percentages of production from civilian markets, subject to orders from Government authority. The reserve quota for book and fine paper had been 20 per cent, but was increased to 35 per cent as of the middle of July, meaning a diversion of 15 per cent of such paper from civilian markets to allocation for Government buying. Container boards and some special papers are already on a 100 per cent basis, and condenser tissue has been added to the 100 per cent list.

Meanwhile, the War Production Board has taken steps to require government users of paper to restrict usage to the same basis as civilian consumers, all state, county, municipal and other government units being restricted to 75 per cent of their base tonnage, and federal departments will be similarly restricted by the Bureau of the Budget.

Pressure within the industry itself has been relieved by an increase in the amount of pulpwood coming forward, and by steps to increase the available supply of wastepaper. The allocation of prisoners of war to pulpwood operations, and campaigns to encourage farm production have had a definite effect that is beginning to be felt in the form of increased inventories of wood at the mills.

The manpower situation is still acute, but with the paper industry listed as an essential industry, it will be easier to hold men in the mills as eligible for industrial deferment.

BOY SCOUTS OPEN NEW WASTEPAPER DRIVE

The Boy Scouts of America opened an intensive two-month nation-wide wastepaper collection drive on August 1. According to the Salvage Division of the WPB, this new drive was designed to help offset an anticipated late summer slump in wastepaper collection, and was organized following receipt of a letter from Donald M. Nelson, WPB Chairman, by Dr. Elbert K. Fretwell, chief Scout executive of the Boy Scouts of America in New York City. The Folding Paper Box Association of America is sponsoring the drive.

A specially prepared WPB Certificate of Merit, signed by Mr. Nelson, will be presented to each Boy Scout troop or Cub pack that collects an average per boy of 1,000 pounds of wastepaper during the drive. A special Boy Scout WPB lapel badge will be awarded individually to all Scouts and Cubs who succeed in collecting 1,000 pounds or more of wastepaper in the two-month period. Proceeds from the sale of wastepaper will go into troop funds for later purchase of camping and other equipment.

INDUSTRY ASSOCIATIONS COMMITTEE APPOINTED

The creation of a WMC Industry Associations Committee was announced on July 23 by Paul V. McNutt, Chairman of the War Manpower Commission. The purpose of this commission is to enlist industry in an intensified search for ways of conserving and fully utilizing manpower to meet critical shortages.

More than 750 industries, divided into 12 groups, each of which is represented by a top-ranking leader in industry as a member of the committee, will participate in the program. Paper, lumber and printing are in a group presided over by Ben R. Ellis, Jacksonville, Florida, secretary-manager, Southern Cypress Manufacturing Association.

RUSSEL WHITNEY TO HEAD PAPERBOARD DIV.

The appointment of Russel W. Whitney as director of the Paperboard Division of the Forest Products Bureau, WPB, was announced on July 10 by Harold Boeschenstein, director of the Bureau. Mr. Whitney succeeds the late G. G. Otto, who resigned on June 16 to return to his company, the Alton Boxboard Company, Alton, Ill. Mr. Otto passed away July 4.

Mr. Whitney has been associated with WPB since January, 1944, first serving as a consultant in the Paper Production program. Later, he was deputy director of the Paperboard Division. He is on leave of absence as vice president of the Hinde & Dauch Paper Company, Sandusky, Ohio.

FOREIGN ITEMS

(The following news of pulp and paper activities in other countries is reprinted from the July 15 issue of *Foreign Commerce Weekly.*)

Small Demand for Paper Products in Egypt

There is little demand for paper and paper products in Egypt. The 1937 census lists only about 16 per cent of the population as literate, and since the standard of living of the majority is not high, the market for those types of paper used where modernization and sanitation are important factors is restricted to the needs of a small portion of the total population.

Although there is some manufacturing activity in Egypt, it is on a small scale. There are only two paper mills of any importance (another will start operations in the near future), and three manual factories, all of which confine their output to wrapping paper and cardboard, using Egyptian rice straw and waste paper as raw materials.

Wood pulp is imported in limited quantities, imports in 1939 totaling only 56 metric tons. Small amounts of the principal types of paper, including cigarette paper, and paperboard are imported each year.

Production in Sweden

Swedish manufacture and export of porous wallboard has declined noticeably during the past few years, states a British trade journal. Production in 1943 was 10,000 tons less, or 30 per cent under that of 1943, and exports in 1943 showed a reduction of 5,000 tons compared with 1942. The picture is even graver when it is considered that exports of porous wallboard in 1943 amounted to only about one-eighth of the 1939 figures.

A prominent Swedish wallboard and fiberboard manufacturer plans to expand the wallboard mill at Hornefors, Sweden, to make possible a larger production of fiardboard, according to the European press. The project which, it is estimated, will be completed by the end of the summer will cost approximately 250,000 crowns.

New Zealand's 1943 Imports

Wood pulp and paper pulp imports into New Zealand during the year 1943 were valued at £NZ61,281 ($198,673 U. S. currency), compared with £NZ48,072 ($155,166.80) in 1942.

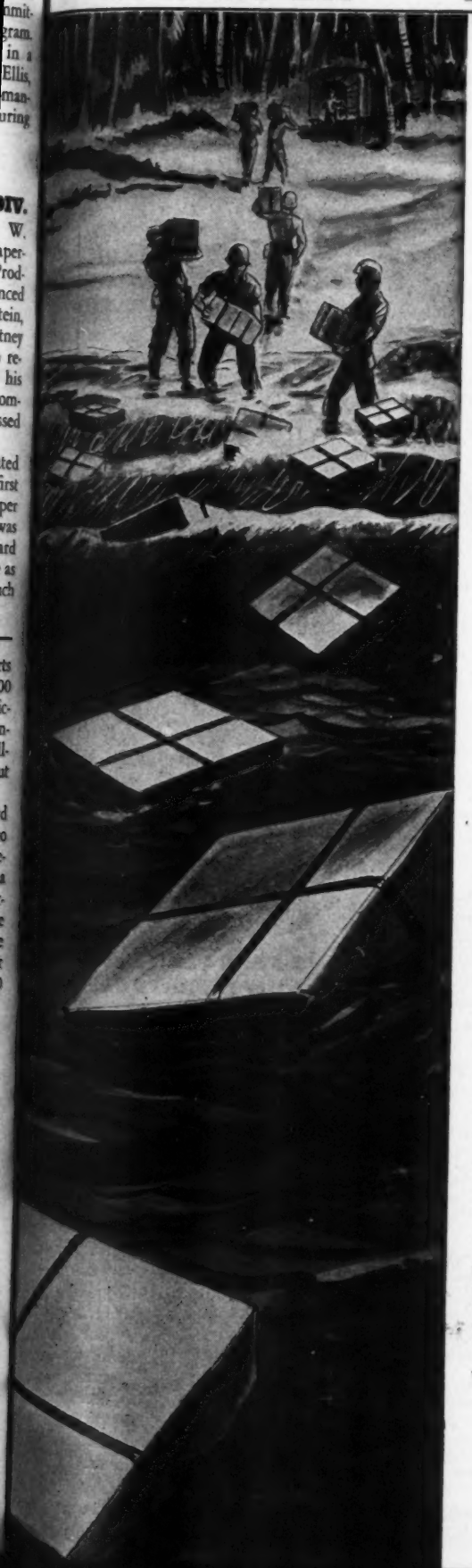
Imports of newsprint during 1943 were valued at £NZ301,897 ($978,750.07), compared with 1942 imports valued at £NZ42,788 ($138,111.11).

Other paper imported into New Zealand was valued at £NZ1,415,257 ($4,588,263.19) in 1943 and £NZ753,971 ($2,433,667.59) in 1942.

Paper Requirements Small in Paraguay

The market for paper and paper products in Paraguay has changed little

PAPER · · · America's 6th Industry



SUPPLIES FLOAT IN PAPER . . .

(NEWS ITEM: *The Army uses 21,000 tons of paper weekly delivering food and medicine to remote Pacific Islands.*)

Delivering food and medical supplies to our Armed Forces stationed on remote islands is no longer a problem. Specially treated water-resistant paperboard containers are being used. Supplies are dropped in the surf, and float in with the tide.

Paperboard containers replace heavy wooden cases . . . paper parachutes for cargo . . . multiwall paper bags for dehydrated foods . . . shell cases made of paper . . . New uses for paper, calling for new standards of lightness and toughness; new standards of quality in performance. New responsibilities—new opportunities for the Pulp and Paper Industry.

Many practical and technical advantages have been discovered by our Research and Development Committee while working on the problems of America at War. Though our men and production facilities are at war, we are experimenting with these advantages to improve the Paper-Making Machinery of the future.

Puseyjones engineers will welcome the opportunity to work with you in your Post-War Planning. We have prepared three informative articles: "The Post-War Fourdrinier," "Development of Stream-Flow Vat System," "The Flow Spreader." Ask for reprints by name.

THE PUSEY AND JONES CORPORATION
Established 1848. Builders of Paper-Making Machinery
Wilmington 99, Delaware, U. S. A.

THE SIGN OF GREATER QUALITY

in recent years. Because of Paraguay's geographical remoteness, low percentage of literacy, and lack of industrialization, the demand for paper is insignificant.

There is no pulp or paper manufacturing activity in Paraguay, and the manufacture of converted paper products is limited in scope—stationery and envelopes account for more than 50 per cent of the total.

Imports of paper consist chiefly of newsprint, wrapping paper, and uncoated book paper.

Paper Situation Satisfactory in Argentina

Argentine paper mills have fared well since the beginning of the war. Ample supplies of wood pulp are being imported from Sweden, and local production of wood pulp has been increased, the foreign press says.

During 1943 Argentina imported 160,000 short tons of paper, compared with 171,870 tons in 1942. The 4-year average, 1938-41, was 224,415 tons.

◆

BRITISH GROUP ON SPECIAL MISSION VISITS WISCONSIN

A group of ten British and two Canadian scientists visited Wisconsin in mid-July, making stops at the U. S. Forest Products Laboratory in Madison; the Laminated Products Company plant in Portage; and the Consolidated Water Power and Paper Company mills in Wisconsin Rapids and Biron.

The group spent a day and a half with George W. Mead, president of Consolidated, visiting the company's plastics, pulp and paper mills. Special interest centered around the plastics mill in Wisconsin Rapids where "Consoweld," resin-treated paper plastic is made. This new plastic is now used for ammunition boxes, floors and seats of airplanes, and a score of other war uses.

The mission reciprocated the visit of an American group to Britain six months ago, and included J. E. Gordon, British scientist, whose research aided in design of Britain's famed Mosquito, only all-wooden warplane now in use; Walter Hardy, head of the British mission, and Edward Reeve Angel, British paper manufacturer.

◆

CAVALCADE OF PRINTING

An exhibit which is termed "A Cavalcade of Printing," will be shown in St. Louis, Missouri, November 3 to 11 at the Stix Baer & Fuller Department Store.

This exhibit will feature unique, and interesting displays of printing and graphic arts equipment, and it is being publicized through an intensive advertising campaign. The exhibit itself will be built around (1) historic and educational phases. It is planned to show a miniature papermaking machine, a replica of an early American press, etc. There will be no charge for space.

Detailed information concerning the exhibit may be obtained from the chairman of the Exhibit Committee, Don O. Pyke, sales promotion manager, Graham Paper Company, 1014-1030 Spruce Street, St. Louis 2, Missouri.

◆

DR. HUGH BAKER MADE PRESIDENT OF NEW ENG. FORESTRY FOUNDATION

A new organization to be known as the New England Forestry Foundation, has just been formed. This is a non-profit organization for the promotion of wood production and improved forestry practice.

The new foundation will begin its work with a four-fold plan in which foresters, woodland owners, wood fabricators, paper and pulp manufacturers and other consumers of forest products will be enlisted to co-operate. It will acquire forest lands by gift and purchase and place them under expert care to make them pay their own way in taxes and management costs. It will assume the management of woodland tracts for owners who wish to be relieved of the responsibility and provide the services of foresters at cost.

Dr. Hugh P. Baker, president of Massachusetts State College and former executive of the American Pulp and Paper Association, has been elected first president of the newly formed foundation. Dr. Baker is a former dean of the New York State College of Forestry.

◆

MANY TREE PLANTATIONS NOW NEED THINNING

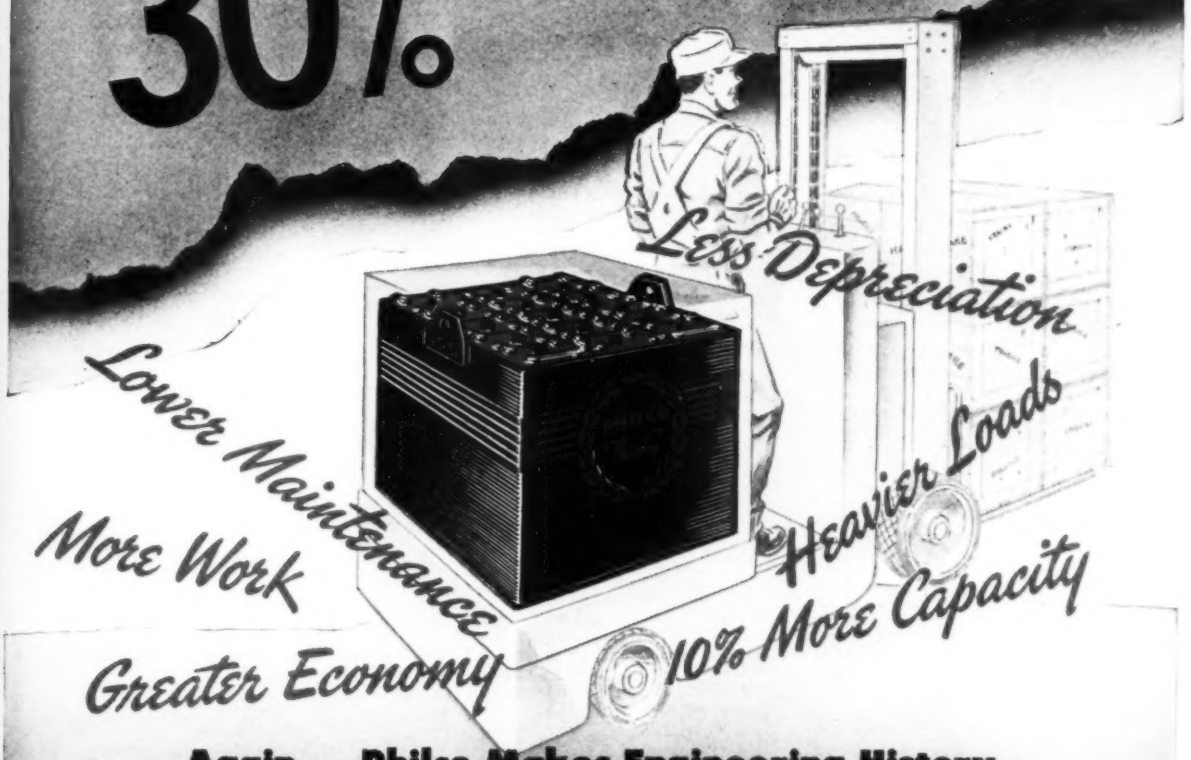
Many owners of reforested areas, including municipalities, now have artificially planted forests on their lands which should receive a first thinning, if it has not already been done, according to Professor Svend Heiberg, of the New York State College of Forestry at Syracuse University.

"Forest tree plantations should be thinned when they have reached twenty years of age and generally every five years thereafter, until they are about 40 years old. Up to this age, "says Professor Heiberg, "these young forests will yield Christmas trees, pulpwood, posts and sometimes other small timbers, dependent upon the market. After the plantations are 40 years old the interval between thinnings may be longer, the yield of pulpwood will decrease and most of the thinnings will be for timber.

Shown above, at Consolidated's plastics mill in Wisconsin Rapids are: Left to right—George W. Mead, president of Consolidated; J. E. Gordon, British scientist whose research aided in design of the Mosquito; Carlile P. Winslow, head of the Forest Products Laboratory in Madison; Walter Hardy, head of the British mission, and Edward Reeve Angel, British paper manufacturer. The background which the group is discussing is a huge sheet of "Consoweld," the resin-treated paper plastic made at Consolidated's plastics mill.

Just Announced!

REVOLUTIONARY NEW "PHILCO THIRTY" GIVES 30% LONGER LIFE!



Again . . . Philco Makes Engineering History

At last, a motive power battery with a revolutionary, new construction that actually gives you *30% longer life . . . and more!* A brand new principle of fabricated insulation . . . developed after years of research in the Philco laboratories, and now introduced after exhaustive tests in actual service. It's the *Philco "Thirty"* . . . your post-war battery, available now in certain types and limited quantities. Write today for full information.

PHILCO CORPORATION, Storage Battery Division, Trenton 7, New Jersey

FOR 50 YEARS A LEADER IN INDUSTRIAL STORAGE BATTERY DEVELOPMENT

"In making artifically planted trees profitable proper thinning must be made because the final crop is thereby allowed to develop to its full maturity most rapidly.

"If no thinning is made the plantation will suffer from stagnation and snow may break many trees. At each thinning about 15 to 20 per cent of the poorest formed trees should be removed. In this way two to three cords of wood an acre may be harvested."

Since 1901 the State has distributed to municipalities, organizations and private individuals a total of 640 million trees. It has been estimated that about 23% of the plantations are more than 20 years old and about 5% exceed thirty years.

Information regarding the best methods for thinning plantations may be obtained by addressing the Extension Department, New York State College of Forestry, Syracuse, 10, N. Y.

◆

FINANCIAL

Paper mill securities were only slightly affected by the "shake-out" which followed a prolonged period of increasing prices on the New York securities markets. With a general recession for profit taking, paper mill shares in many cases were only quoted nominally, holders not being anxious to dispose of their holdings. A feature of the month's trading was the market for Certain-teed Products Preferred, resulting from internal activities in the company's organization. Selling at about 76 in late June, the final sale price on July 25 was 96½.

American Box Board Company—Net income for twenty-four weeks ending May 14 was $112,818, as against $87,159 for the same period in the preceding year.

Brown Company—Net profit for twenty-eight weeks ending June 10 was $778,792, as against $674,730 for the same period the previous year.

Celotex Corporation—Net profit for six months ending April 30 was $209,092, as against $481,657 for the similar period the preceding year. The earnings for the quarter ending April 12 were $127,207.

Container Corporation—Net profit for the half year to June 30 was $1,195,143 as compared with $833,219 for the same period in 1943.

Crown Zellerbach Corporation—Net profit for the fiscal year ending April 30 was $7,603,441, as against $7,343,287 for the preceding fiscal year. Indebtedness was reduced during the year from $3,500,000 to $2,500,000, and in May was reduced another $1,000,000.

Marathon Corporation (formerly Marathon Paper Mills Company)—Net income for six months to April 30 was $866,234, and for the year ending October 31 the adjusted net income was $1,261,581.

Mead Corporation—Net income for the 12 weeks ended June 10 was $249,076, as compared to $228,603 for the 12 weeks ended June 12, 1943.

Rayonier, Inc.—Net profit for the year to April 30 was $1,688,709 as against $1,877,459 for the year before.

Schumacher Wall Board Corporation—Net profit for the fiscal year ending April 30 was $147,927 as against $158,060 for the preceding year.

Sutherland Paper Company—Net profit for the first six months of 1944 was $338,709, as against $370,808 for the same period in 1943.

New York Stock Exchange—Stocks

	Closing Prices July 25	June 24
A. P. W. Paper Co.	*3½–3¾	4¼
Celotex	14½	14⅞
Same Preferred	18¼	18¼
Certain-teed Products	7⅛	7⅛
Same Preferred	96½	76⅜
Champion P & F Co.	*26–27	26½
Same Preferred	*112¼–114	112½
Container Corp.	26	25¼
Cont. Diamond	12	11⅞
Crown Zellerbach	18¾	18⅜
Same Preferred	*101¾–102¼	100
Dixie Vortex	18	17
Same "A"	46⅜	46¼
Robert Gair	4¾	4¾
Same Preferred	*16¼–16½	14¾
Gaylord Container	*16½–17	17⅜
Same Preferred	*53⅛–54½	53½
International Paper	18¼	18⅛
Same Preferred	83	83⅜
Kimberly-Clark	40	*37–39
McAndrews & Forbes	*29¼–29¾	28⅛
Masonite	43⅜	47¼
Mead Corp.	10¾	11¾
Same Preferred	*92–95⅞	93
National Container	22⅞	17
Paraffine Cos	55⅞	56⅛
Same Preferred	106	105¼
Rayonier	15¾	16½
Same Preferred	32⅜	32
Scott Paper	*42–42½	41½
Same 4½% Pref.	*112–113⅜	110¼
Same 4% Pref.	*109–109½	110
Sutherland Paper	*32–33	33
Union Bag & Paper	12	12⅛
U. S. Gypsum	79¼	86
Same Preferred	179	174

New York Stock Exchange—Bonds

Abitibi 5%	83¾	79¼
Celotex 3¾%	.....	103¼
Certain-teed 5½%	101¼	102
Champion P & F Co. 4½%	.....	.....
International Paper 5%	104½	104
Same 6%	108	108

New York Curb Exchange—Stocks

Am. Boxboard	.....	.....
Great Northern	34¾	34⅜
Hummel-Ross	6¾	6
St. Regis	6	5½
Taggart	5¾	6
United Wall Paper	3¾	2⅞

*Closing Bid and Asked Prices.

THOMSON PAPER MILLS IS THE NAME OF NEWLY FORMED NEW YORK CO.

A newly formed company, The Thomson Paper Mills, Inc., Thomson, New York, has just been incorporated.

The interest of the A. & P. Corrugated Box Corporation in the old Iroquois Paper Company plant at Thomson has been acquired by The Gibraltar Corrugated Paper Company, Inc., North Bergen, New Jersey, and this plant is now being operated by the new corporation. In charge of the new corporation is H. L. Joachim, who is director and vice president of the Thomson Paper Mills, Inc.

◆

▶▶▶ A BRANCH OFFICE in Vancouver, British Columbia, has been established by National Business Publications and its subsidiary organizations, publishers of a number of periodicals including the *Pulp and Paper Magazine of Canada*. The office is located at 917 Vancouver Block, 736 Granville Street, Vancouver, and is in charge of W. G. R. Murphy, formerly of the Montreal office.

◆

IMPORTS

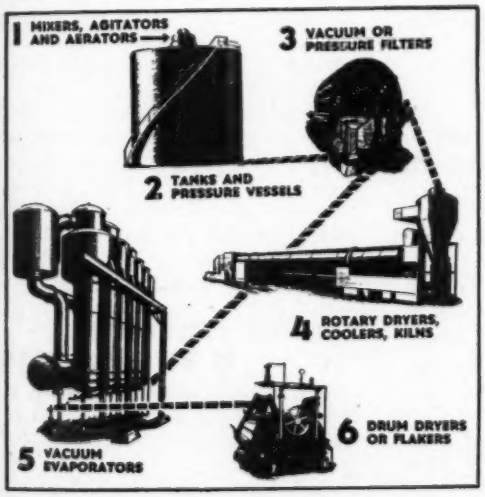
The shortage of container board for the making of boxes for military as well as civilian supplies has resulted in some unusual purchases of such material in Canada, according to Warren B. Bullock, Manager of the Import Committee of the American Paper Industry. Imports of several such types of material have been questioned on the basis of their classification for duty. Shipments of paperboard for cereal manufacturers at Minneapolis and Buffalo have been classified for duty at 30 per cent as vat-lined board, but the importers claim the material is not vat-lined and that it is properly dutiable at 10 per cent as plain paperboard.

A Milwaukee importer has brought in two shipments of deep yellow material less than 12 points in thickness, and the material has been classified at 30 per cent as paper not specially provided for, the Tariff Act providing that no material under 12 points in thickness may be classified as paperboard. The importer, however, is claiming the lower rate.

An importer of printing paper from Newfoundland claims a shipment of paper weighing 35.8 to 36 pounds under the TAPPI testing method, is not dutiable as classified by the Customs officials, but duty free as standard newsprint.

Considerable note paper in pad and

When you decide on your new plant or process!


1 MIXERS, AGITATORS AND AERATORS
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5 VACUUM EVAPORATORS
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When your engineers or consultants have planned that ideal new plant or process you want—*then* have one thoroughly competent equipment manufacturer assume full responsibility for delivering *"the complete package"*.

It can be done. General American Process Equipment is set up to give you just that kind of service. This organization embraces five outstanding manufacturers in the process equipment field, supplemented by an engineering and research staff of international reputation, and backed by the General American Transportation Corporation. *It offers you a combination of technical and economic advantages which we believe is unique in industry.*

"One organization, one responsibility, one highest standard of performance." Let us tell you exactly what that means in the design, manufacture and installation of process equipment. *Address:*

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envelope form, also boxed papeterie is being imported from Great Britain and is being assessed for duty at the British value of the paper, plus the British purchase tax. The importers claim the inclusion of the British tax is illegal.

◆

JOB-TRAINING PLAN NOW IN OPERATION AT POWELL RIVER CO.

First use of the U. S. job-training plan has been made in the pulp and paper plant of Powell River Company, at Powell River, British Columbia. This training program is under the direction of A. G. Gardner, assistant maintenance superintendent, assisted by George Smith, of the Boeing subassembly plant, and Joseph Stevens, groundwood division.

Keen interest has been shown in the courses by the Powell River employees who already have taken the lectures. A new series of lectures is scheduled to begin at the Powell River plant shortly.

◆

▶▶▶ PLANS FOR CONSTRUCTION of a $75,000 plant for Sidney Roofing and Paper Company, Ltd., Industrial Reserve, Victoria, British Columbia, are under consideration, according to a recent announcement by Logan Mayhew, managing director. It is stated, however, that the project may not proceed for some months, or until after the War. Meanwhile, construction has started on a concrete outdoor storage platform at a cost of $6,000. This platform may be used as foundations for the new plant.

◆

▶▶▶ A FOUR-STORY bleach plant is being erected at Ocean Falls, British Columbia, for Pacific Mills, Ltd. This is part of the big construction program commenced about three years ago at the Ocean Falls plant. When the entire project has been completed, a total expenditure of approximately $500,000 will have been made. It is expected the work will be finished by autumn.

◆

BROWN COMPANY AND CORPORATION ELECT 3 NEW VICE PRESIDENTS

Three additional vice presidents have been elected by the Brown Company, Berlin, New Hampshire, and its Canadian pulp-producing subsidiary, the Brown Corporation, La Tuque, Quebec.

Herman G. Schanche, general manager of Woods Operations since joining the company in March, 1943, has now been elected vice president in charge of Woods Operations for both companies. Mr. Schanche formerly was with Abitibi Power & Paper Company, Ltd. He has been active in the industry for many years, and is a member of various industry committees and associations.

Downing P. Brown, who has been assistant to the vice president in charge of sales of the Brown Company, has been elected vice president. He will continue to be located in New York City.

Another vice president of Brown Corporation is Wentworth Brown, who will continue to serve as production manager of both companies. Before being located in Berlin, Mr. Brown was for some time in charge of the Canadian mill.

◆

▶▶▶ DEPUTY DIRECTOR of the Printing and Publishing Division of the WPB is the new appointment given to Donald G. Shook. Mr. Shook has been attached to the Forest Products Bureau since August, 1943. For the past six months he has served as special assistant to Harold Boeschenstein, acting director of the Bureau. Prior to that he was a consultant in the Printing and Publishing Division. Besides serving as deputy director, he will be acting chief of the Magazine and Periodical Section of the Division.

◆

LOG SALVAGE PLAN BEING TRIED OUT ON VANCOUVER ISLAND

Small diameter logs, heretofore left in the woods as waste after logging operations, and estimated to contain 20 per cent of the original cut, are now being cut and prepared for pulpwood as the final link in the experiment of salvaging logging waste sponsored by the Powell River Company, the Comox Logging Company, and the British Columbia Provincial Government, on Vancouver Island. Initial shipment of rafts arrived at Powell River recently, containing 504,000 board feet of pulpwood, and a small sawmill unit capable of cutting 25,000 board feet per 8-hour shift went into operation.

Unique in the experiment is the fact that all materials used in shipping and conversion may be classed as salvage, inasmuch as the baling wire to make the small logs into bundles of the rafts is scrap, and the sawmill unit was constructed by Powell River Company mechanics from used materials.

The present operation is purely of an experimental nature to determine if the yield would justify this method of handling logging waste for conversion into pulpwood.

◆

NEW CANADIAN COMPANY TO SALVAGE TIMBER

The salvaging of timber on logged-over land, will be carried on by a new organization recently incorporated by Vancouver, British Columbia, interests. The new company, Pulp Wood Products, Ltd., has started with capital of $100,000.

A central camp at Nanaimo and portable operations in logging sites on Vancouver Island are planned. The program includes saw equipment and conveyors sufficiently small to be carried to logging operations on logging trucks. Here small dimension timber and snags left by high-lead logging will be cut to cord-wood lengths and transported to the central plant where it will be sorted and chipping equipment will turn out raw material for distribution to pulp mills.

◆

▶▶▶ A PENSION PLAN for employees of the Ontario Paper Company, Thorold, Ontario, has just been announced, and a pamphlet giving full details of the plan has been distributed to employees throughout the organization. Employees of the associated companies, Ontario Paper Company, Quebec North Shore Paper Company, Quebec and Ontario Transportation Company, Baie Comeau Company, and Marlhill Mines, Ltd., will be eligible for participation in the plan.

◆

SALE OF TEXTBOOKS IS UP THIS YEAR

That the pulp and paper industry of North America is maintaining and increasing its efforts to turn out a good product in time of war is evidenced by the latest report from Royal S. Kellogg, secretary of the Joint Textbook Committee.

This report reveals that the sale of textbooks *The Manufacture of Pulp and Paper* totaled 527 volumes during the first half of 1944. This is 152 volumes more than were sold in the same period last year.

Total sales of these books since the appearance of Volume I and II in 1921 have now exceeded 37,000 copies which have gone to all parts of the world.

★ ★ ★ ★ ★

POWELL VALVES

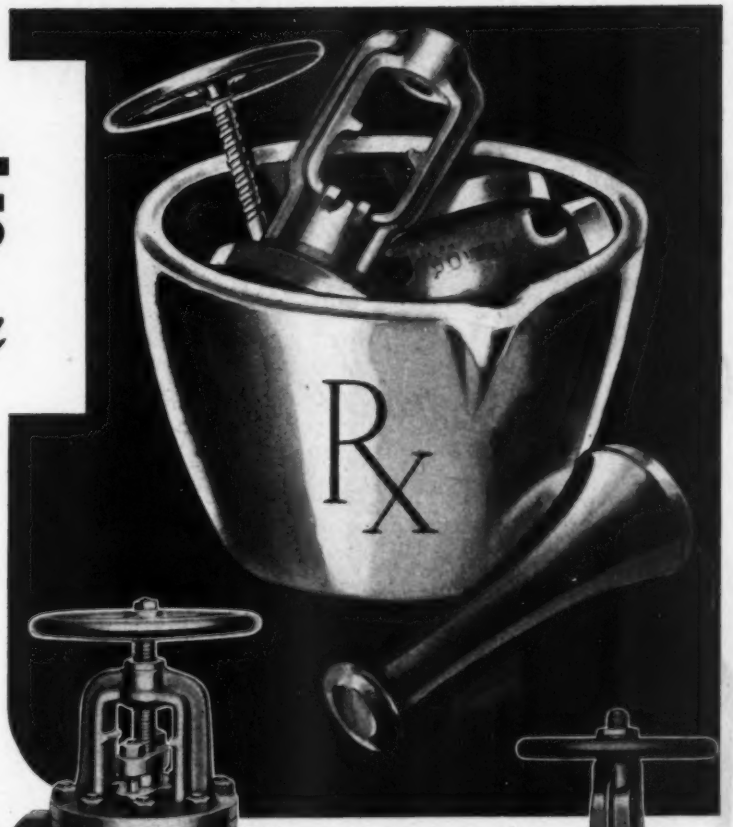
by prescription

★

"Doctor-book" treatment is of dangerously doubtful value when an undiagnosed condition exists, or is suspected to exist! The experienced collaboration of physician and pharmacist is not only indicated but required.

Specific conditions to be met in the installation and functioning of valves likewise demand scientific specialization . . . the working-together, understandably, of engineering and manufacturing experience to produce the valve to meet these conditions.

The successful experience of nearly a century of POWELL Engineering and manufacture of valves—and valves only—is at your service . . . in consultation, in prescription, in supply. This clinical know-how, gained in hundreds of thousands of "cases" is the professional asset we share with every POWELL Valve buyer.



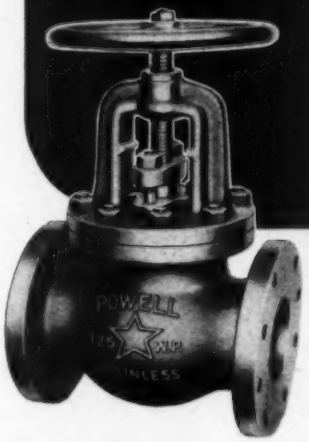


Fig. 2457—Large Size Stainless Steel Globe Valve for 125 pounds W. P. Has flanged ends, outside screw rising stem threaded through bronze yoke bushing, full round bolted flanged yoke bonnet, and plug type disc. Sizes 4" to 12", incl.

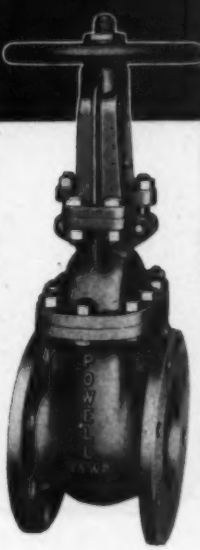


Fig. 2453—Stainless Steel Gate Valve for 125 pounds W. P. Has flanged ends, outside screw rising stem threaded through bronze yoke bushing, bolted flanged bonnet and taper wedge solid disc. Shelf is provided on inner side of yoke arms for suspending gland out of stuffing box when removing packing. Sizes 2½" to 30", incl.

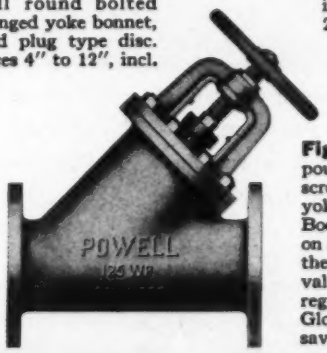


Fig. 1944—Stainless Steel "Y" Valve for 125 pounds W. P. Has flanged ends, with outside screw rising stem threaded through bronze yoke bushing and bolted flanged yoke bonnet. Body can be provided with cleanout pockets on special order. This type of valves provides the straightway full flow area of the Gate valve plus the throttling feature and easy regrinding and renewability of disc of the Globe valve, thereby effecting considerable savings in maintenance.

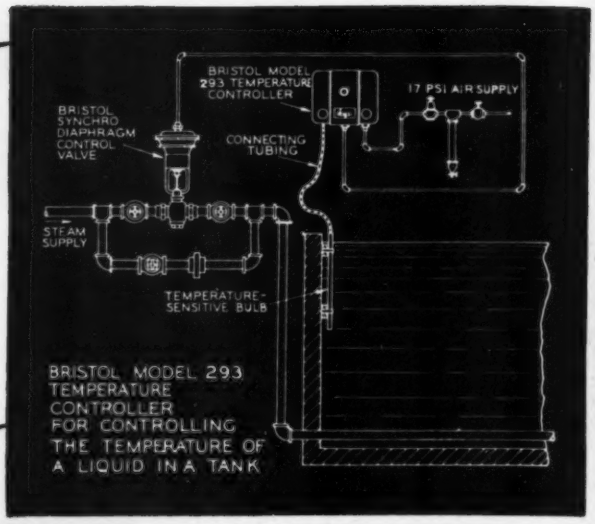
The Wm. Powell Co.

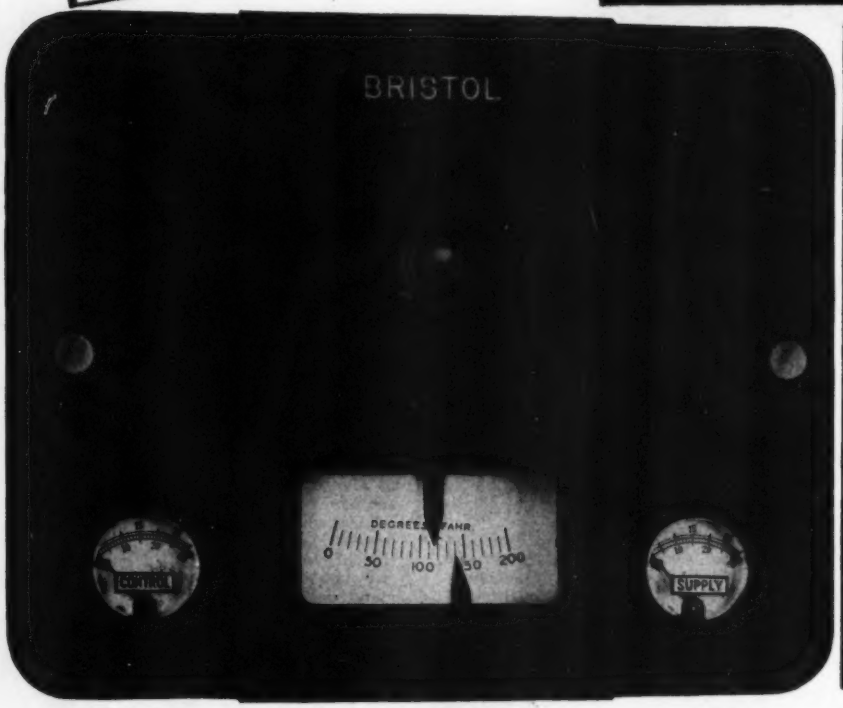
Dependable Valves Since 1846

Cincinnati 22, Ohio

POWELL VALVES

WHERE VARIABLES *must be controlled* BUT NOT NECESSARILY *recorded*


BRISTOL MODEL 293 TEMPERATURE CONTROLLER
17 PSI AIR SUPPLY
BRISTOL SYNCHRO DIAPHRAGM CONTROL VALVE
CONNECTING TUBING
STEAM SUPPLY
TEMPERATURE-SENSITIVE BULB
BRISTOL MODEL 293 TEMPERATURE CONTROLLER FOR CONTROLLING THE TEMPERATURE OF A LIQUID IN A TANK



Here ARE THE VARIABLES THE MODEL 93 CAN CONTROL

Temperatures
from −125° to 1000°F.

Pressures
from full vacuum to 4000 psi.

Liquid Level
in open or closed vessels.

Humidity
from 0 to 100% R. H.

Flow
of steam, gas, air and liquids through pipes.

Bristol's new Model 93 Air-operated Controllers are designed for those cases where you want variables put under accurate control, but where chart records are either not required or are otherwise provided for.

Model 93 is a small, compact, simple instrument having a precision measuring element and Bristol's Free-Vane Control—the frictionless system which is the most accurate of all air-operated designs. You get an absolutely true visual indication of results.

A new bulletin, No. A115, gives complete details. Write for a free copy to 149 Bristol Road, Waterbury 91, Conn.

Engineers Process Control for Better Products and Profits

BRISTOL

AUTOMATIC CONTROLLING AND RECORDING INSTRUMENTS

THE BRISTOL COMPANY, Waterbury 91, Connecticut
The Bristol Co. of Canada, Ltd. Toronto, Ontario
Bristol's Instrument Co., Ltd. London, N. W. 10, England

A LONG HAUL . . . but worth it!

It was a long haul by canal, river and rail from Hamilton to New England — longer still to the frontier paper mills of Wisconsin and Minnesota, a week's trip by stage coach from the western terminus of the railroad. • Yet even in those times Hamilton Felts were standard equipment with mills that supplied paper to the publishers, printers and industries of the re- United States. The time and cost of transportation were more than offset by the savings at the mills. Hamilton Felts removed more water from the web, with corresponding increase of speed at the machines. They gave better, stronger, more uniform formation to the sheets, with resulting reduction of broke. They ran "true" over the rolls, requiring fewer stops for adjustment.

What was true eighty years ago is still true — from the thinnest tissue to the heaviest board there is a Hamilton Felt that will do your work better, faster and at lower cost.

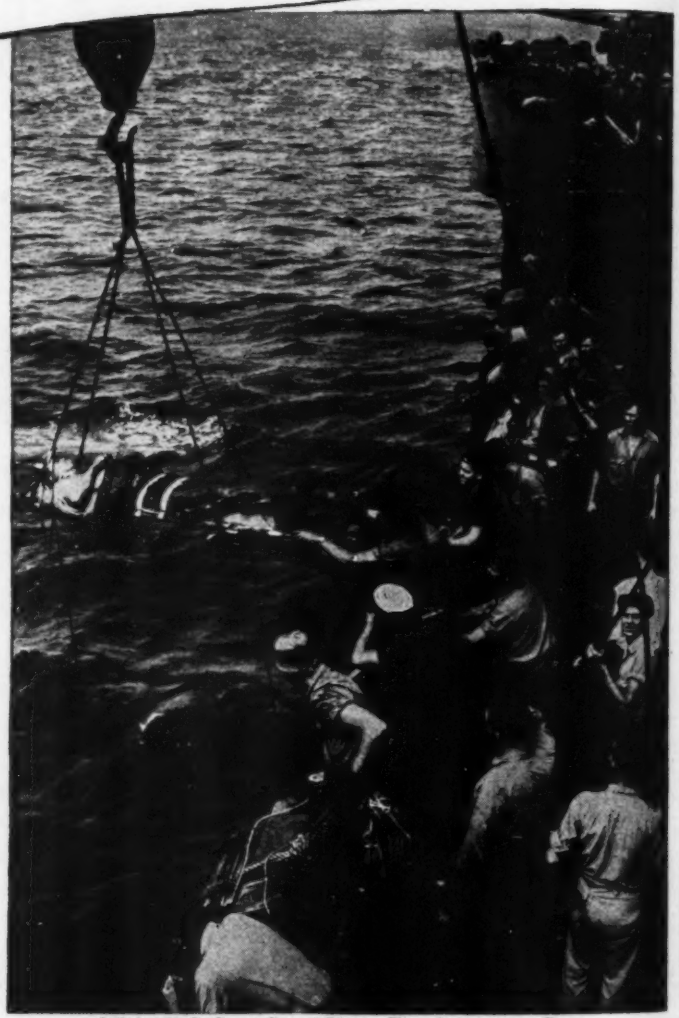
SHULER & BENNINGHOFEN, HAMILTON, OHIO

• Miami Woolen Mills •

Hamilton Felts

• Established 1858 •

Just in case you've eased up... ON YOUR PAY ROLL PLAN



Official U. S. Coast Guard Photo: The elevator to a Coast Guard-operated transport hospital

Pause one brief moment. Compare your lot—and that of the men and women in your employ—with the lot of the infantrymen who meet the enemy face to face, who do the hardest fighting, who suffer the most casualties.

Let the full impact of war's unending grimness swiftly convert any tendency toward complacency into revitalized urgency. Remember—the war is not yet won.

As top management and labor, you've been entrusted with two major responsibilities—steadily maintained production, and steadily maintained War Bond Sales *through your Pay Roll Savings Plan.*

Decide *now* to revitalize your plant's Pay Roll Plan. Have your Bond Committee recheck all employee lists for percentages of participation and individual deductions. Have Team Captains personally contact each old *and new* employee. Raise all percentage figures wherever possible.

Don't underestimate the importance of this task. This marginal group represents *a potential sales increase of 25% to 30% on all Pay Roll Plans!*

Your success will be twofold: A new high in War Bond Sales; and a new high in production. Because a worker with a systematic savings plan has his mind on his work—not on post-war financial worries. He's taking care of the future now. His own. And his Country's future. *Help him!* REVITALIZE YOUR WAR BOND PAY ROLL SAVINGS PLAN.

Back the Attack!

SELL MORE THAN BEFORE!

The Treasury Department acknowledges with appreciation the publication of this message by

THE PAPER INDUSTRY AND PAPER WORLD

This is an official U. S. Treasury advertisement—prepared under the auspices of Treasury Department and War Advertising Council.

There's no illusion about the cash savings!

YES, it's easy to handle light wall Taylor Spiral Pipe, and of course that cuts costs all along the line—means a lot more piping installed per man per day.

If the strength of Taylor Spiral Pipe were in the same proportion to its weight as that of heavy pipe, the savings it offers would be limited to light duty applications. But that isn't the case at all. Its spiral construction—that reinforcing spiral seam—makes it stronger than any other kind of pipe of equal wall thickness.

In hundreds of installations this light-but-rugged pipe has proved that it can handle a large percentage of the moderate and low pressure services ordinarily assigned to Standard Thickness pipe—handle them adequately and with strength and service life to spare.

Check over the services listed below. If you are now using Standard Thickness pipe for applications of this kind, changing to Taylor Spiral Pipe will cut your costs way down—in many cases to half that of the heavy pipe it so adequately replaces.

Switching to Taylor Spiral Pipe for such uses is made easy by the complete range of sizes and wide variety of fittings. Thicknesses range from 18 to 6 gauge; sizes from 4" to 42"; joint lengths up to 40 ft. All types of end joints and couplings, all kinds of fittings and specials or fabricated assemblies are produced by Taylor Forge & Pipe Works, assuring complete service and undivided responsibility.

TAYLOR FORGE & PIPE WORKS

General Offices & Works: Chicago, P. O. Box 485 ★ New York Office: 50 Church St. ★ Philadelphia Office: Broad Street Station Bldg.

TAYLOR SPIRAL PIPE

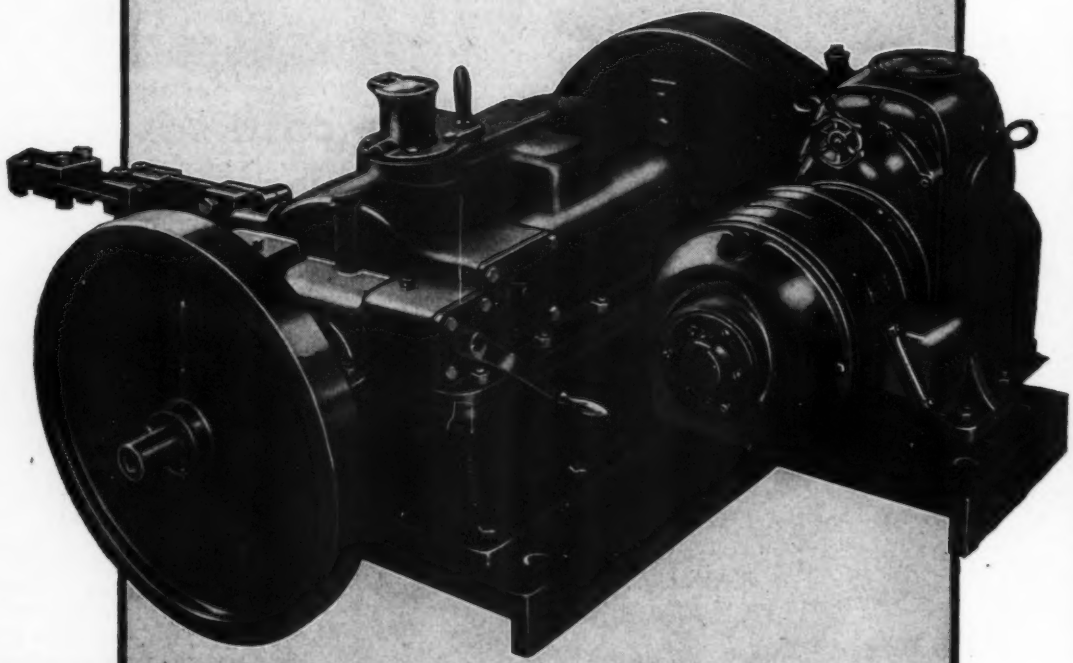
CHANGE TO TAYLOR SPIRAL PIPE FOR:

- High and Low Pressure Water Lines
- Low Pressure Steam and Air Lines
- Steam and Diesel Exhaust Lines
- Vacuum and Suction Lines
- Blower Piping
- White Water Lines
- Pulp Stock Lines
- Paper Stock Lines
- Alkaline Lines
- Size Lines
- Swing Pipe
- Spray Pond Piping

Dependability . .

THE SIMPLEX SHAKE

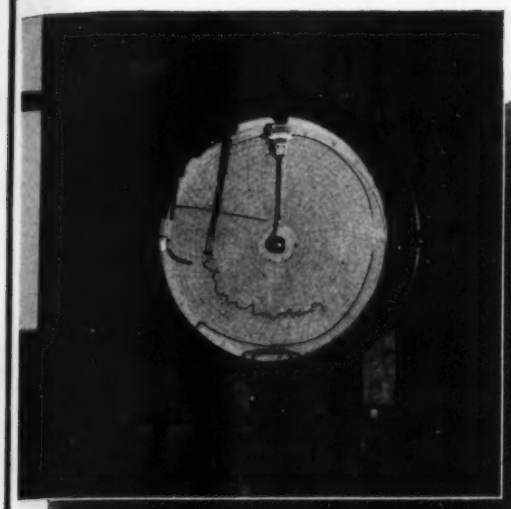
. . Easy Installation
. . Positive Action
. . Adjustment of Speed and Stroke While Running



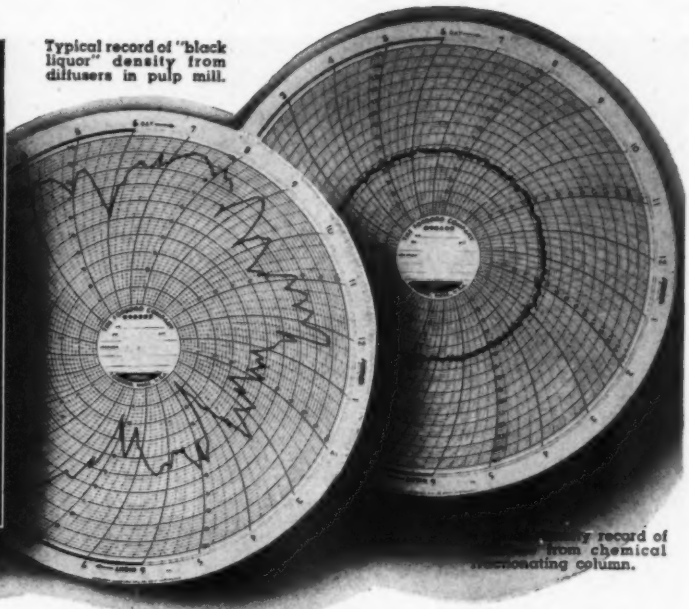
The Bagley and Sewall Company

Builders of Paper Making Machinery

WATERTOWN, NEW YORK

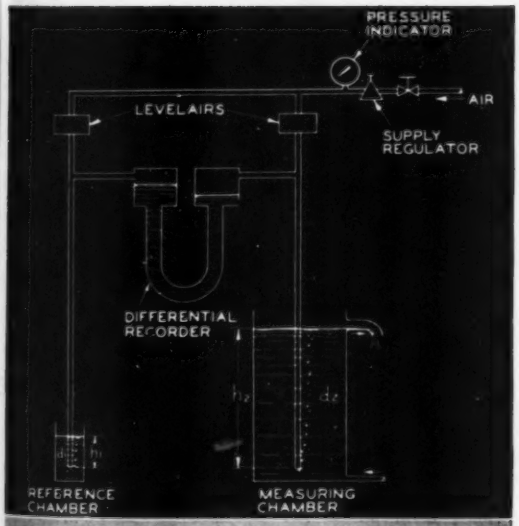


Typical record of "black liquor" density from diffusers in pulp mill.



...y record of ... from chemical ...fractionating column.

NOW...Continuous Records of Liquid Density, *Automatically!*



HOW IT WORKS This diagram shows the operating principle of the Foxboro Density Recorder. The head (density x height) of a variable-density liquid is compared with the constant head of a constant-density reference liquid by the air-bubble method of head measurement. Reference chamber contains constant-density liquid. The variable-density liquid flows continuously through the measuring chamber at constant depth. The Foxboro Density Recorder accurately measures and records the differential pressures.

There are no gaps in your density records for flowing liquids . . . and no possibility of errors due to misreading of a bobbing glass hydrometer . . . when you put a Foxboro Liquid Density Recorder on the job!

This automatic hydrometer is a permanent installation that accurately measures density at every instant and continuously records it. The instrument can be located anywhere up to 1000 ft. from the measuring point. Without attention from the operator, it gives a complete, graphic check on density, even in heavy fluids such as crude oil, ceramic "slip" and paper mill "black liquor".

Foxboro Density Recorders may be calibrated in specific gravity, Baumé, Barkometer, Brix or Twaddell. Open records permit easy reading to small unit values. For many processes, automatic Foxboro Density Recording Controllers also are available.

Write for detailed Bulletin A-264 on these important production aids. **The Foxboro Company, 158 Neponset Avenue, Foxboro, Mass., U. S. A.**

RECORDING · CONTROLLING · INDICATING

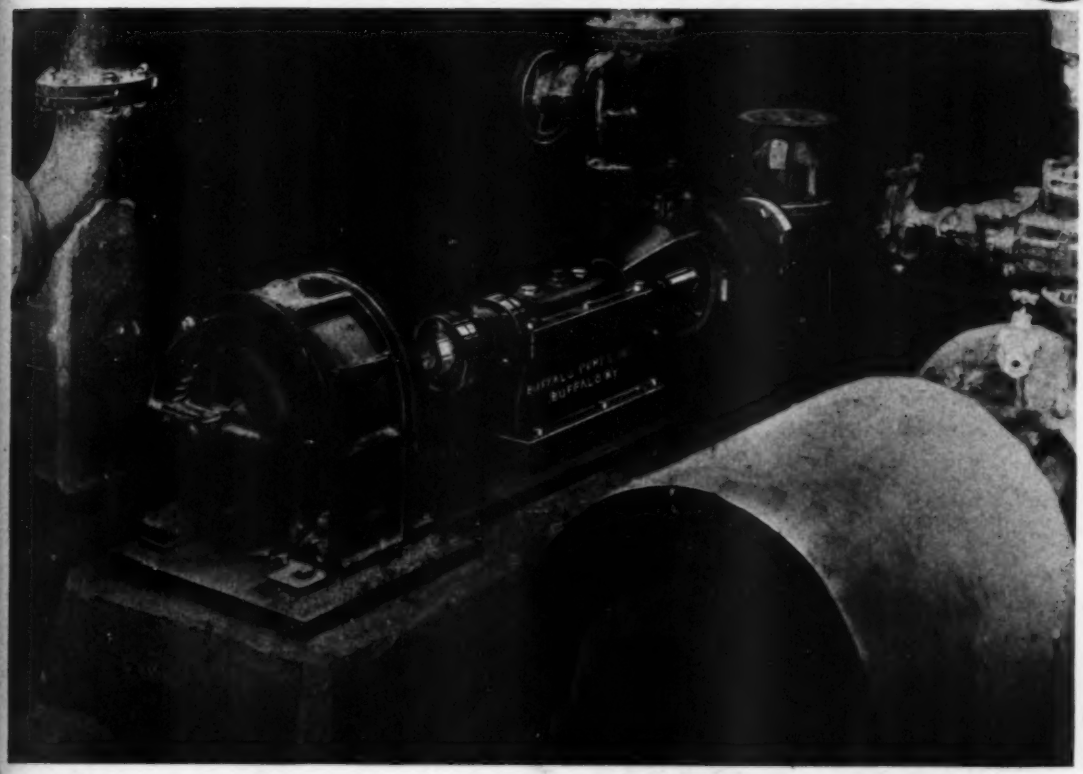
FOXBORO Instruments

PERKINS
HOLYOKE
TRADE MARK REG.

There is no substitute for Perkins Quality

B. F. PERKINS & SON, Inc.
HOLYOKE, MASS., U.S.A.
LARGEST MANUFACTURERS OF CALENDER ROLLS IN THE WORLD

PAPER MILLS *Need* PRACTICAL PUMPS



A Buffalo No. 4 Full Ball Bearing Pump handling 500 gpm on slurry service.

● With reduced maintenance crews, mill operators are more than ever interested in dependability of equipment. Buffalo Pumps, with their non-clogging impellers, heavy-duty bearings, rigid over-size shafts, heavy cast iron bearing stands and diagonally-split housings, are built to "stay-in-operation." When servicing becomes necessary, every detail of the design provides for quick accessibility.

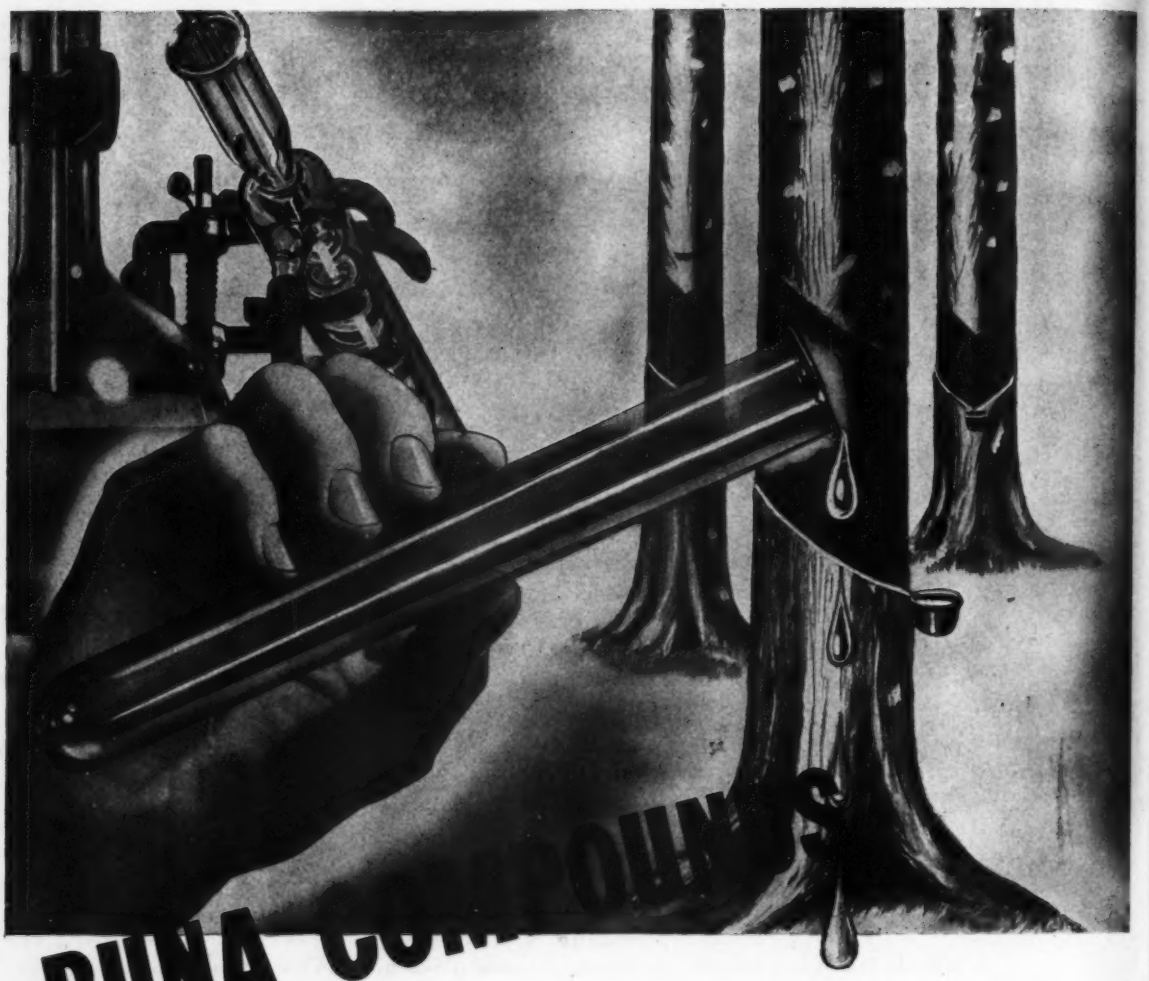
Buffalo Paper Mill Pumps are described fully in Bulletin No. 953-F.

BUFFALO PUMPS, INC.

213 Mortimer St. **Buffalo, N. Y.**

Canada Pumps, Ltd., Kitchener, Ont.

"Buffalo" Hi-Consistency PAPER STOCK PUMPS



BUNA COMPOUNDS

for PAPER IMPREGNATION PROBLEMS

(Curing and non-curing stocks)

Longtime specialists in the fields of Combining, Coating and Impregnating Compounds, the UBS Laboratories are ideally set up to develop the particular Buna Compounds your operations require *Write today, describing your paper Impregnation Problems*

Address all inquiries to the Union Bay State Chemical Company, Rubber Chemicals Division, 50 Harvard Street, Cambridge 42, Massachusetts.

UBS

UNION BAY STATE
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Serving Industry with Creative Chemistry

ORGANIC CHEMICALS · SYNTHETIC LATEX · SYNTHETIC RUBBER
PLASTICS · INDUSTRIAL ADHESIVES · DISPERSIONS
COATING COMPOUNDS · IMPREGNATING MATERIALS · COMBINING CEMENTS

SWENSON
Digester Blow CONDENSERS

●

Heat Recovery Systems for Wood Pulp Mills

Swenson design gives more even distribution of steam over the surface of vertical tubes in the condenser . . . making possible maximum recovery of heat from steam released in the digester blow tank.

Any pulp carried over with the blow steam is effectively removed by a centrifugal separator integral with the condenser. The tubes are thereby kept free of fibres. There is no cleaning problem.

The indirect absorption of heat provides uncontaminated hot water for pulp washing and other mill uses. The Swenson arrangement will provide hot water at a constant flow and constant temperature.

Operation is automatic—synchronized with blowing cycles.

Maintenance is low. (Tube life and performance are greatly increased by the use of chromium plated tubes.)

Atmospheric and stream pollution are minimized.

Pulp Washers . . Black Liquor Evaporators
Lime Sludge Filters . . Causticizing Equipment

SWENSON
SWENSON EVAPORATOR COMPANY
Division of Whiting Corporation
15653 Lathrop Avenue, Harvey, Ill.

The chipped teacup of the PATRIOTIC Mrs. Jones

No matter who the guest—Mrs. Jones brings out her chipped teacup with no embarrassment. On the contrary, with a thrill of pride.

Not very pretty, that chip. But it bears witness to the fact that Mrs. Jones has her nation's welfare at heart.

Mrs. Jones has given up all unnecessary spending for the duration. By doing *without*—she is helping to fight inflation.

Maybe she doesn't know all the complicated theories about inflation. But she does know that her government has asked her *not to spend.*

So Mrs. Jones is making all the old things do . . . not only that teacup. She's wearing her clothes for another year—and another. She's not competing with her neighbors for merchandise of any sort.

And the dollars she's not spending now are safely put away (and earning interest) for the peacetime years ahead. *Then* those dollars will buy things that can't be had for any price today.

If we all are like Mrs. Jones, there will be no inflation with skyrocket prices. If we all are like her, dangerous Black Markets cannot exist.

A chipped teacup stands for all that . . . for a *sound, secure* U. S. A.

7 RULES FOR PATRIOTIC AMERICANS TO REMEMBER EVERY DAY

1. Buy only what you *absolutely need.* Make the article you have last longer by proper care. Avoid waste.

2. Pay no more than ceiling prices. Buy rationed goods only by exchanging stamps. (Rationing and ceiling prices are for *your protection.*)

3. Pay willingly any taxes that your country needs. (They are the cheapest way of paying for the war.)

4. Pay off your old debts—avoid making new ones.

5. Don't ask more money for the goods you sell or for the work you do. Higher prices come out of everybody's pocket—including *yours.*

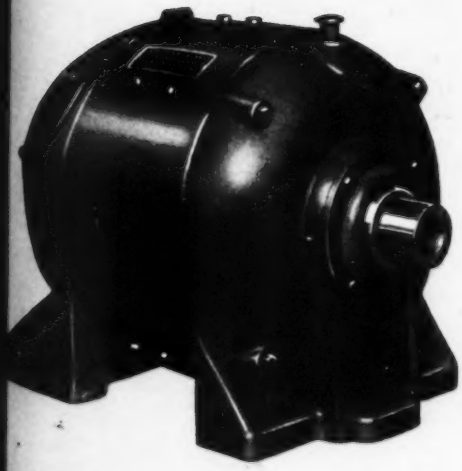
6. Establish and maintain a savings account; maintain adequate life insurance.

7. Buy all the War Bonds you can—and hold 'em!

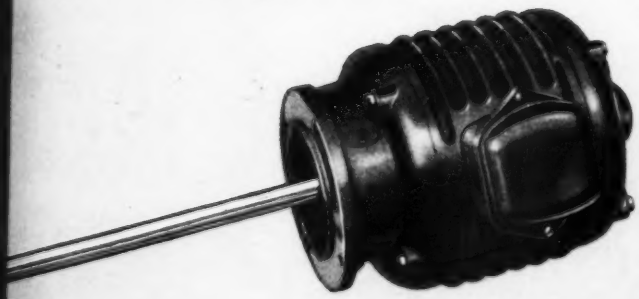
HELP US KEEP PRICES DOWN

Use it up . . . Wear it out . . . Make it do . . . Or do without

A United States War message prepared by the War Advertising Council; approved by the Office of War Information; and contributed by this magazine in cooperation with the Magazine Publishers of America.



There is a size and type **LOUIS ALLIS** *electric motor for every industrial requirement.*



THE LOUIS ALLIS CO., MILWAUKEE 7, WIS.

R.P.M. and H.P. alone won't do!

If you are planning a new product that will require a special electric motor in its construction, our engineering development department will welcome the opportunity of working with you.

For over forty years we have been developing special motors for special jobs — and during the recent years many outstanding improvements in electric motor design, construction and performance have been created by us — motors that are playing an important role in helping win the war.

Many of these new motor developments will be available for general industrial use after final victory.

* * *

Machinery designers no longer attempt to use a standard motor for a special job — it is much more economical and efficient to obtain a motor with exactly the electrical and mechanical characteristics required to perform a specific job than it is to try to doctor up a standard "shelf" motor to do the job.

No matter what your electric motor requirements are — we will welcome the opportunity of serving you — your needs will receive our most prompt and careful attention in every way.

THE LOUIS ALLIS CO., MILWAUKEE 7, WIS.

In Sulphite-Mill Service

Cooper offers the experience of sixteen years in the application of stainless castings to the individual and special requirements of sulphite-mill service. There are Cooper stainless castings that were installed in 1928, and still in service. They stand up.

THE COOPER ALLOY FOUNDRY CO. • • • 125 Bloy St., Hillside, N. J.

Cooper

THE *Only* ALLOY FOUNDRY WITH *All* THESE FACILITIES

- Laboratory control over raw materials and finished products.
- Dual foundry . . . both hand and machine molding.
- Electric arc and high-frequency-induction melting furnaces.
- Centrifugally-cast castings.
- Heat treating of castings up to six feet in size.
- X-ray and Gamma-ray inspection.
- Machine shop . . . specially equipped for finishing stainless steel.
- Improved cleaning . . . including Lustracast electrolytic finishing which leaves all surfaces bright.
- Castings furnished rough, polished or fully machined . . . one ounce to two tons.
- Development of special alloys to meet unusual requirements.
- Technical consulting service.

THE paper industry's very practical way of overcoming America's wartime paper shortage is to put just as many logs as possible through the debarkers, and chippers, then by belt conveyor to sorting screens. The more pulp, the more paper.

Operating conditions generally are rough and tough . . . slow speeds, high speeds, heavy loads . . . and pulp and paper mills everywhere are protecting their machines by lubricating them with *TEXACO*.

Texaco Crater, for example, cushions load shocks, stops undue wear, quiets the noise of large open gears. *Crater* doesn't ball up, channel or throw off, but clings to tooth surfaces, following through from gear to gear, under high pressures, temperatures and peripheral speeds.

Texaco Crater penetrates to the very core of wire rope preventing rot, sealing each wire in a tough, viscous film that reduces internal friction and wear, keeps out moisture, prevents corrosion, keeps ropes strong longer.

Texaco lubricants have proved so effective in service that they are definitely preferred in many fields.

Texaco Lubrication Engineering Service is available to you through more than 2300 Texaco distributing points in the 48 States. The Texas Company, 135 East 42nd Street, New York 17, N. Y.

FREE! 36-page booklet explains new, low cost protection against rust. Tells how to make equipment last years longer. Write for your copy.

TEXACO

TEXACO CRATER

TUNE IN THE TEXACO STAR THEATRE EVERY SUNDAY NIGHT—CBS ★ HELP WIN THE WAR BY RETURNING EMPTY DRUMS PROMPTLY

Editorial

The Pulp and Paper Institute of America

▶▶▶ IT IS BECOMING CLEARER daily that the paper industry should create for its protection, progress and profit an over-all organization to be known as The Pulp and Paper Institute. The demand for such an organization, truly representative of the entire industry, arises from the maze of multiplying problems which now confront the industry and which will continue to appear in the postwar era immediately ahead.

What is the paper industry's program for meeting its postwar problems? Who can speak authoritatively for the paper industry as a whole? The paper industry has no strong, central, cohesive setup, embracing the production, conversion and distribution of its paper products. It is a matter of common comment that the paper industry is "an overly-organized industry." If that be true, isn't it about time that a change be made; that the industry proceed without delay in setting up a strong, central organization of experts, charged with the responsibility of determining by survey, research, fact-finding and scientific investigation, all the right answers to all those problems which today and in the days to come, contribute to the growing confusion and complexities of orderly operations and constitute an unsolved bar sinister to our economic progress and profit? We think so.

Other industries have done so. The Iron & Steel Institute, the Railroads, the Meat Institute, the Glass Industry, the Aviation Industry — all of them found themselves confronted with critical industrial problems and organized to meet them. They all found themselves definitely behind the eight ball in their relations with the Government, the public, and afflicted with internicene competition. They provided industry setups, supported by all units in their industries, guided by expert fact finders. They solved their problems. The paper industry should follow their examples.

There are 525 separate concerns producing and distributing paper throughout this country. They have come up through the years from small beginnings until now, the aggregate tonnage of the units represents the sixth largest industry in America

These various units have brought up with them certain habits, customs and inheritances of thought which will not carry over into the era ahead without amendment.

They are splendidly, ruggedly individualistic. They have been intensely competitive. They have run their plants as private enterprises. They are devoid of industry consciousness.

Now, comes this World War which has clearly demonstrated that if they are to continue to conduct their businesses as separate private enterprises solely, playing the exciting game of trying to make money, they are destined to awake some day and find that there is no longer any game to play. Therefore, we believe that now is the time for the units of the industry to unify. They must unify before they can write an industry Magna Charta. In union, there is strengtth. A strong, cohesive, central organization of all the units of the industry into a Pulp and Paper Institute, is the modern, intelligent, self-interest answer to the problems facing us.

★ ★

Pulp and Paper in the Other American Republics

▶▶▶ THE PULP AND PAPER INDUSTRY of the United States following the close of World War II may be more export conscious than ever before. It is true that the industry has done some export business for years. Paper was being exported as far back as 1870, and wood pulp as early as 1900, but never has the export volume been large in comparison with production tonnage.

With World War II upsetting the common European sources of supply for pulp and paper of the American republics to the south of us, it has been natural for those countries to look to Canada, Newfoundland, and the United States for as much help as possible in meeting market requirements, and, in some instances at least, to expand their own facilities of production.

This wartime situation probably has given the United States pulp and paper industry a better opportunity to ascertain the importance of this export market than would have been possible without it. The industry may desire to hold its gains and even expand this market when World War II ends.

To better understand the requirements of this market, the Bureau of Foreign and Domestic Commerce has analyzed pulp and paper statistics of eighteen American republics and has reported its findings in a publication entitled *Pulp and Paper Trade Statistics of the Other American Republics, 1938-1941.* The report, presented as a supplement to *World Paper Consumption, 1927-1938,* prepared by the Bureau in May, 1941, has been published by the Bureau as a help to American pulp and paper manufacturers in their appraisal of postwar markets.

Statistical tabulated data on imports of pulp and paper and paperboard as well as consumption figures on paper and paperboard are given. Likewise, descriptive information on the domestic industry in each of the eighteen countries, arranged alphabetically by countries, is presented.

The countries included in the study are Argentina, Bolivia, Brazil, Chile, Colombia, Costa Rica, Cuba, Ecuador, Guatemala, Honduras, Mexico, Nicaragua, Panama Republic, Paraguay, Peru, Salvador, Uruguay, and Venezuela. Any pulp and paper mill organization in the United States which is interested in doing business in one or more of these republics will find the contents of the previously mentioned publication worth studying and considering in relation to any postwar planning program it may be at work upon.

Current Thought

WILLIAM SIBLEY

Boom—or Bust?

▶▶▶ THE PROBLEM OF reconversion to peacetime production gives me the jitters. The matter of disposing of some seventy billions of dollars worth of war material is, to me, very annoying. I can only sit back and, while chewing my fingernails, hope that Barney Baruch (or whoever) is far more successful *this* time than they were the last time.

The Americans were completely and totally unprepared for reconversion on November 11, 1918. The transition from war to peace production had not been planned, with the result that it was disorderly, chaotic, costly. The Government immediately removed price controls, with the result that eggs went to $1.00 a dozen (in some sections) and the price of everything from rent to rainbarrels skyrocketed accordingly. Cancellation of war contracts caught thousands of manufacturers with huge stocks of half-finished, practically worthless war goods on hand. Four millions of soldiers were demobilized within a year. I was one of them, and each of us was given $60 and carfare home. Millions of war workers were dismissed, and there was no system set up to afford relief or alternate employment. No system of employment exchanges had been set up to aid them in finding other jobs.

One of the reasons why I get the jitters when I think of the reconversion job, almost immediately ahead, is the fact that during World War I, we were in the fight twenty months, whereas in this war we are already thirty months out and the end is not yet in sight. In 1918, we had some four million men under arms; this time we have eleven million. During the First World War we employed some nine million war workers. This time we are employing over thirty million—and need still more. In the old days we spent fifteen billions of dollars a year to wage the war. This time we are spending more than ninety billions. The last war took a quarter of the nation's production; this war requires a full half of the national output. Accordingly, the problem of reconversion will be more than proportionately greater.

There is, of course, one essential difference between this and the last war. Today we are waging *two* wars, whereas during 1918 we had but one. If *both* of our present wars were to end simultaneously, this nation would experience the most violent industrial upheaval and dislocation it has ever known. It would well nigh ruin this nation for the next two generations. But if, as seems much more likely, the European war will terminate quicker than the war in the East, then we can expect a gradual transition from war to peace production. Public expenditures doubtless will decline by a third, come the close of the European adventure. War workers will be displaced as reconversion sets in. Demobilization will begin and unemployment will increase. But the Government's demand and need for war supplies and for relief and rehabilitation still will be large, and the gradual resumption of civilian production will create new jobs for large numbers of the temporarily unemployed. While the degree of distress during this gradual transition will be unequal (some communities and industries suffering more than others), the over-all economy will not be so greatly and drastically shocked.

But there is the spectre of the mountain of war material which must be disposed of—a mountain larger and higher than the Matterhorn—estimated at from seventy to one hundred billion dollars worth of merchandise, ranging from automobiles to xylophones, from bobby pins to blimps. After the last war the Government permitted much of the war material to be auctioned or sold to anyone who could meet the bid, or name the price. This gave rise to a host of "Army Stores"—dealing in everything from clothing to locomotives. The existence of these stores continued to be a menace to commercial enterprise for years after the Armistice. What will happen to the tremendously increased volume of material *this* time? Certainly, some system must be devised to protect industrial production, come the peace, else we again will have an industrial slump.

But we should not succumb to fatalism. We can do much, each and individually, to protect the nation against industrial decline, inflation, or overly large unemployment. Depressions don't just happen. They are made. And since this be true, they are also subject to control. Erroneous decisions can be righted. Wrong policies can be changed. We *can* learn from previous experience (although it would seem this is the hardest thing we have to do). Labor policies can be changed. Labor can insist upon the maintenance of a wage level and thus sacrifice employment, or it can acknowledge the need for wage modification and thus preserve jobs. Business can continue to demand high prices and thus go without sales, or it can reduce prices and thereby preserve markets. Government can legalize monopolies and thereby curtail production, or it can enforce competition and expand production. Government can continue to enlarge its sphere of interference with private industry and thereby become an unscrupulous, tax-free competitor (and ruin smaller enterprises), or it can withdraw into its constitutional province of "governing" instead of "being," and thereby encourage private risks, private gains, and free enterprise.

"Believe it or not," what the nation does and in which direction the nation goes depends largely upon *you*, Mr. Citizen. If you, the average "citizen" will do everything you can, by word of mouth and by letter to your friends, congressmen and editors, express your desire for a reduction of governmental encroachment upon private business—for a definite plan for the disposal of war material, for a sound scheme for disposing of war workers and the reinstatement of soldiers to either old jobs (or to ones they now wish to have), for the gradual demobilization of the eleven million men and women now under arms instead of suddenly dumping them upon the labor market, you will be doing your part toward bringing order out of possible chaos—a boom out of a possible bust.

RELIABLE PERFORMANCE

Proven BY WORLD WIDE USE

Timken Seamless Tubes operating under the most difficult conditions of high temperature, high pressure and severe corrosion are providing reliable day after day performance for petroleum refiners in every part of the world.

The quality of Timken Seamless Tubing is entirely controlled within the Timken organization. The same melting and rolling practices responsible for the excellence of Timken Alloy Steels produce the steel for Timken Tubing — the same rigid system of testing and inspection guards it.

When you buy tubes specify Timken Seamless Tubes. They will provide longer tube life, less down time and minimize maintenance.

A member of our Technical Staff will be glad to help choose the analysis that fits your specific needs or a request written on your firm's letterhead will bring data on a number of steels for high temperature service. Steel and Tube Division, The Timken Roller Bearing Company, Canton 6, Ohio.

TIMKEN

Speed Your Production

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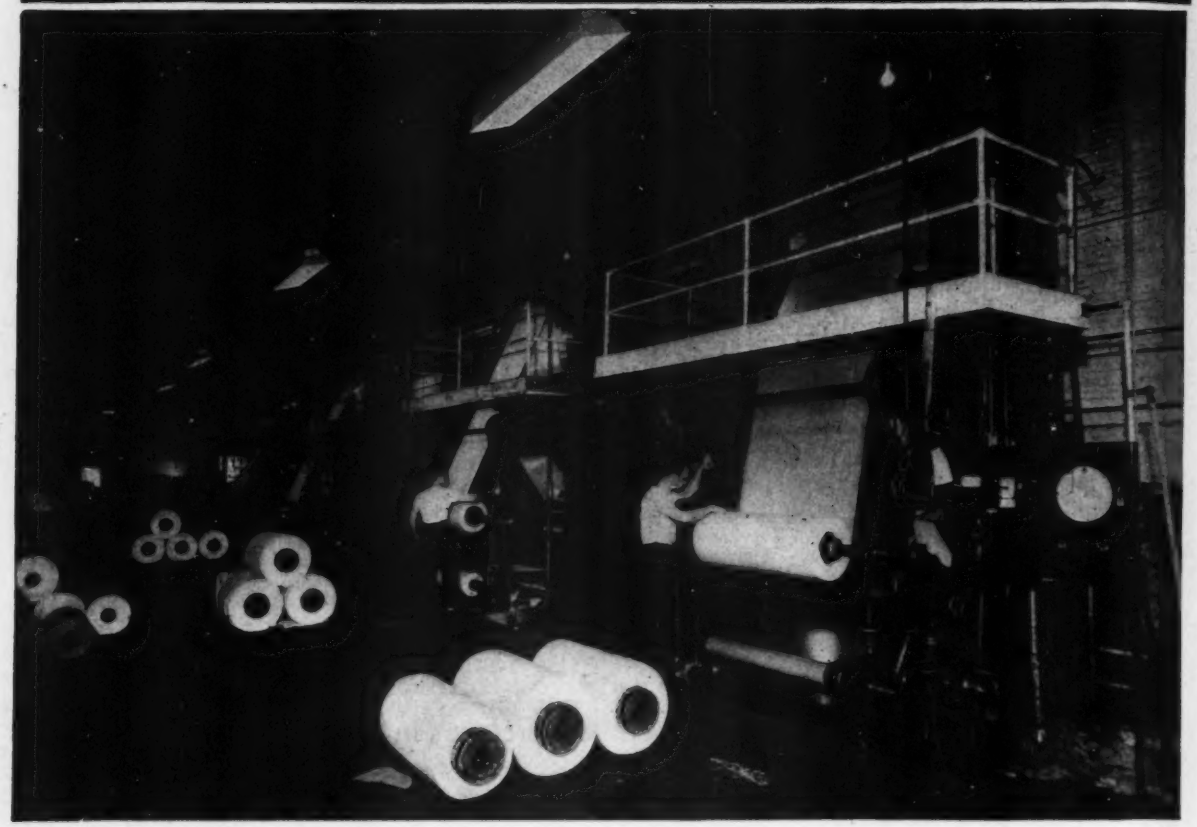

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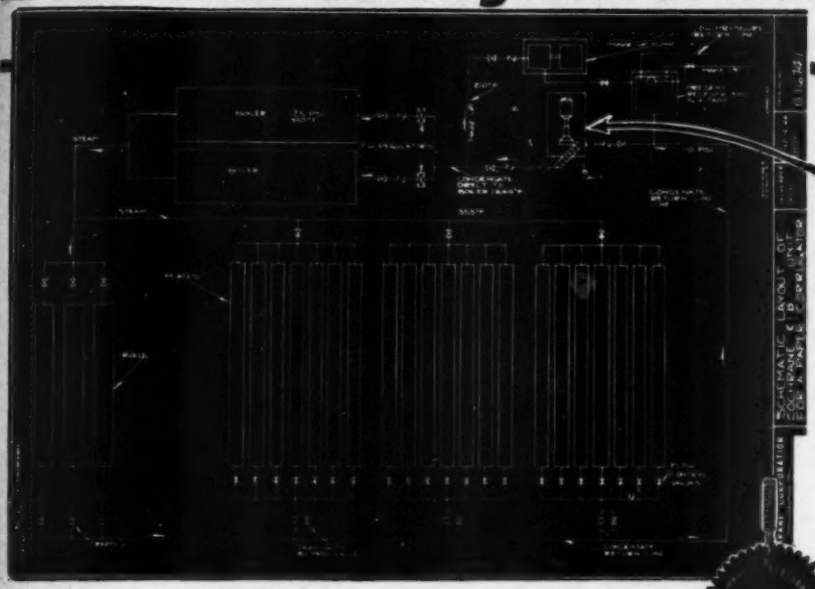

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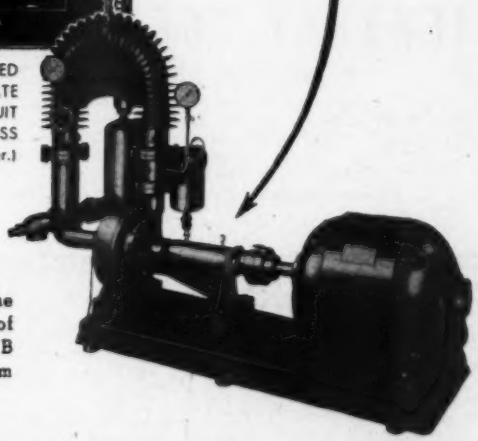

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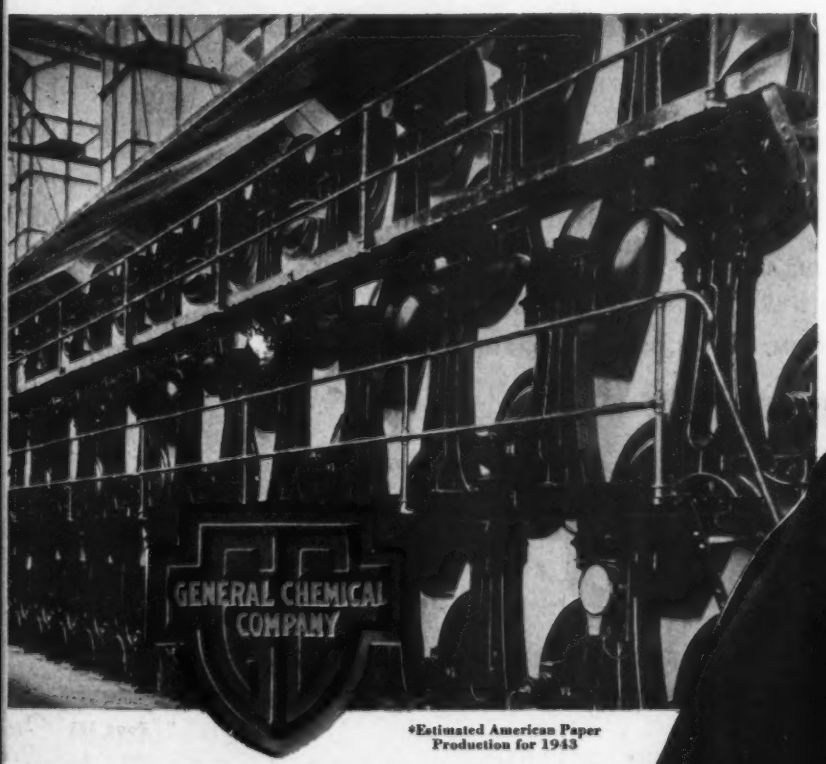

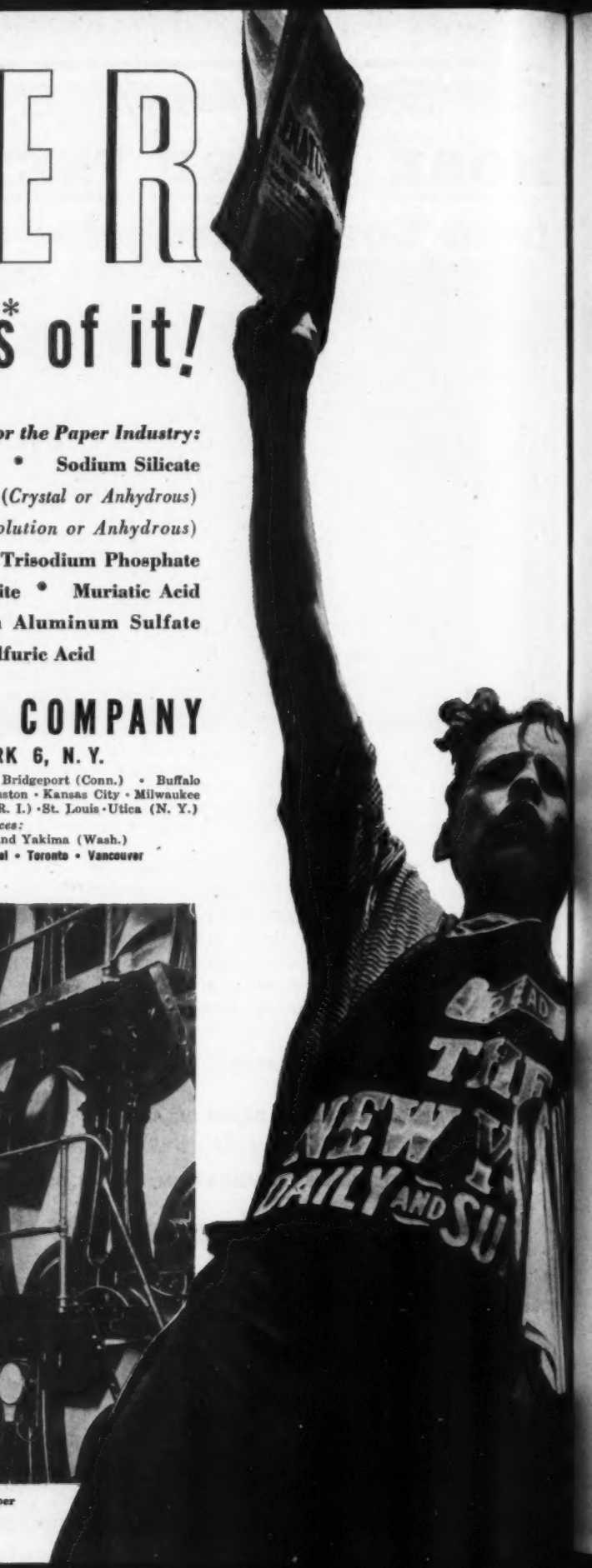

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Chemical Differentiation of Hardwoods and Softwoods Used in Pulping

LOUIS ELSBERG WISE, Research Associate, The Institute of Paper Chemistry

▶▶▶ ONE SUMMER MORNING found several of my colleagues busily at work studying some of the chemical derivatives of lignin. Suddenly one of them asked: "Just what is meant by the terms 'hardwood' and 'softwood?' What is the real difference between them?" That question, it seems, has puzzled more than one person.

When we speak of hardwoods and softwoods, reference is not made to their hardness or softness to the touch, or to the difficulty or ease with which they can be whittled with a knife. Nor are we referring to the engineer's connotation in which hardness is expressed as the load in pounds required to imbed (to half its diameter) into the wood a sphere of specific dimensions.

In our terminology, the hardwoods are obtained from trees belonging to a great division of the plant kingdom — the *angiosperms*. The leaves of these trees are usually relatively broad and flat. Their seeds are borne in ovaries. Examples of the hardwoods are the aspens, maples, and the birches.

The softwoods are derived from trees belonging to the group known as the *gymnosperms*. The leaves of such trees are needle-shaped. The trees bear cones, and the more important ones are often spoken of as the conifers. Examples of the softwoods are the spruces, the pines, and the firs. Some softwoods are quite hard (e.g. the hard pines), whereas certain hardwoods are surprisingly soft. For example, balsa wood, which is also very light, actually can be indented by a man's finger nail.

In the Americas and in Europe both hardwoods and softwoods are widely used in pulp manufacture. From the standpoint of tonnage and general excellence as raw materials, the softwoods are dominant. Table 1 gives some of the more important American pulpwoods. These are far from being the only species that come to the pulp mill, but they are the ones that have received at least some chemical study. Chemical data on many useful species, however, are still pitifully meagre, especially when it comes to fundamental studies. Here lie some of the most inviting avenues for future research.

Do the hardwoods and the softwoods show recognizable chemical differences? Can a chemist differentiate rapidly between the two classes of woods? This question reminds me of another incident in my laboratory at Syracuse years ago, when I was confronted by two well-filled jars, each of which contained a sample of wood flour. By some mischance the jars were unlabeled. However, I knew that one contained finely ground aspen wood whereas the other was filled with powdered Sitka spruce. Which was which? Within five minutes we had the answer.

A few milligrams of each sample was placed in a test tube and each was treated with a few millimeters of chlorine water. After two or three minutes the solution was decanted off, and the wood residue was treated with an excess of sodium sulphite solution. One sample turned a nondescript orange-brown. That was the softwood—Sitka spruce. The other showed a brilliant purple coloration. That was the hardwood — aspen. The test that had been applied was a modification of the ingenious Mäule reaction (1). This differentiates between the wood of angiosperms and that of gymnosperms. Invariably the common hardwoods give a characteristic cerise coloration, while those of the softwoods are colored orange- or yellowish-brown. This distinction is due to the differ-

TABLE 1—American Pulpwoods that Have Been Studied Chemically

Softwoods		Hardwoods	
Common Name	*Scientific Name*	Common Name	*Scientific Name*
Black Spruce	*Picea mariana*	Quaking (or trembling aspen)	*Populus tremuloides*
White Spruce	*Picea glauca*	Bigtooth aspen	*Populus grandidentata*
Red Spruce	*Picea rubra*	Southern cottonwood	*Populous deltoides virginiana*
Sitka Spruce	*Picea sitchensis*	Black willow	*Salix nigra*
Jack pine	*Pinus banksiana*	Black gum	*Nyssa sylvatica*
Longleaf pine	*Pinus palustris*	Swamp black gum	*Nyssa biflora*
Slash pine	*Pinus caribaea*	Yellow birch	*Betula lutea*
Loblolly pine	*Pinus taeda*	Paper birch	*Betula papyrifera*
Shortleaf pine	*Pinus echinata*	Beech	*Fagus grandifolia*
Red pine	*Pinus resinosa*	Chestnut	*Castanea dentata*
White pine	*Pinus strobus*	Tulip tree (Yellow poplar)	*liriodendron tulipifera*
Eastern hemlock	*Tsuga canadensis*	Red gum	*Liquidambar styraciflua*
Western hemlock	*Tsuga heterophylla*	Sugar maple	*Acer saccharum*
Eastern larch (Tamarack)	*Larix laricina*	Basswood	*Tilia glabra*
Douglas fir	*Pseudotsuga taxifolia*		
Balsam fir	*Abies balsamea*		
Lowland white fir	*Abies grandis*		
Silver fir	*Abies amabilis*		

ences in the lignin of the two groups, differences which will be discussed later.

There are also quantitative analytical differences between the two groups of wood. Some of these are summarized in Table 2. In considering the analysis of wood, it is well to recall that every chip or bolt of wood contains three major chemical components. These are *cellulose*, the *hemicelluloses*, and *lignin*. The first two, taken collectively, are often spoken of as *holocellulose*. Besides these three major constituents, wood contains small amounts of mineral matter and significant (and very variable) amounts of a great variety of substances, which may be extracted with water, or with suitable neutral organic solvents like alcohol, benzene, and ether. These components are the "extractives" or "extraneous components" of wood. They are the substances that lend character and individuality to a specific wood. They include essential oils, phytosterols, resin acids, fatty acids and fats, pigments, tannins, water soluble carbohydrates, cycloses, saponins, etc. They may make a certain wood resistance (or open) to insect or fungal attack. They may account for the odor, color, or poisonous properties of a wood. They may contribute to the wood's resistance to pulping. However all these classes of extractives are never found brigaded together in *one* specific wood.

Besides the extraneous substances, every wood contains certain characteristic chemical groups. For example, the "methoxyl group" (CH_3O—) is associated largely but not entirely with the lignin. The "acetyl groups" (CH_3CO—) are parts of the holocellulose which also contains a subordinate portion of the methoxyls. Some of the components and groups referred to, will be found in the quantitative data shown in Table 2.

Although generalizations on the basis of limited data are admittedly dangerous, certain trends become clear from the figures in Table 2. Needless to say, all these analyses were made on samples of sound normal wood. Compression wood, or wood that had suffered partial decay would have given a false picture. If we examine these data, we find a *striking difference between the pentosan content of the hardwoods and the softwoods*. This is confirmed by many unpublished analyses made at the Institute of Paper Chemistry. In the hardwoods, the pentosan content seldom drops below 17 per cent. Often it exceeds 21 per cent. In the softwoods, the pentosan content seldom rises above 14 per cent, and is often as low as 8-9 per cent. *In general, the lignin content of the softwoods is higher than that of the hardwoods.* However the differentiation is far from a sharp one. Only in certain hardwood species, like the aspens, is a *very* low lignin content the general rule. An exceptionally high lignin appears from a few analyses of the black gums (hardwoods; *Nyssa sp*), which fall well within the lignin range of the common softwoods. Ordinarily, however, this is not the case.

Holocellulose is usually considerably higher in the hardwoods than in the

TABLE 2—Analytical Differences between Softwoods and Hardwoods (Pulpwoods).
(When only one figure appears, a single determination was recorded in the literature.)

Wood analyzed	Pentosans (per cent)	Lignin (per cent)	Holocellulose (per cent) (based on extractive-free wood)	Methoxyl (per cent) in wood	Acetic acid (per cent) Derived from wood	Lit. Ref. No. (Cf. Lit. Cited)
SOFTWOODS						
Black spruce	15.5	27.3	.....	4.6	.....	(2)
White spruce	11.5—12.5	27.8—30.9	73.3	5.3	1.59	(3), (4)
Red spruce	9.1—11.5	26.6—30.0	72.9	4.6	.....	(5), (6), (7)
Sitka spruce	8.1—9.0	27.4—29.6	.....	.....	.....	(8)
Jack pine	12.2—14.0	25.5—29.9	72.5	.....	.....	(7), (9), (10), (1a)
Longleaf pine	11.1—12.4	27.9—30.8	.....	5.1	0.76	(1a), (11)
Slash pine	9.1—12.3	24.9—27.6	.....	.....	.....	(11), (12)
Loblolly pine	8.8—12.8	24.2—28.3	.....	4.1—4.2* 6.2—6.9†	1.28—1.41* 1.00—1.11†	(11),(1a),(13),(14)
Shortleaf pine	12.1	26.4—29.0	.....	.....	.....	(1a), (11)
Red pine	.....	25.1				(15)
White pine	8.6—10.6	26.1—27.5	.....	4.2* 4.6†	1.68* 1.43†	(16), (17)
Eastern hemlock	9.5	32.7—34.5	68.5	.....	.....	(1a), (18)
Western hemlock	8.3—10.2	28.8—31.8	.....	4.9	.....	(1a), (19)
Douglas fir	7.2—10.6	25.3—30.2	.....	5.0	1.04	(4), (20), (21)
Balsam fir	7.0—10.6	28.7—31.5	69.9	.....	.....	(7), (5)
Lowland white fir	8.9	27 —27.2	.....	.....	.....	(1a)
Silver fir	9.0—10.5	26.6—29.8	.....	.....	.....	(1a), (22)
HARDWOODS						
Trembling aspen	18.7—22.1	18.8—23.5	82.5	.....	.....	(23), (18)
Bigtooth aspen	19.7—23.8	16.3—17.7	82.5 82.5	5.3 5.35	5.5—6.1	(24), (8)
‡Southern cottonwood	18.0—19.0	22.0—23.6	.....	.....	.....	(25), (23)
Black willow	18.8	21.9	.....	.....	.....	(25)
Black gum	.....	28.4	.....	.....	.....	(1a)
Yellow birch	21.8—26.9	18.6—28.1	78.0 81.3	5.3—6.1	1.8—8.8	(17), (24), (1a)
Beech	24.5—25.6	20.6—22.3	79.0 78.0	6.3—6.5	6.05—7.1	(24)
Yellow poplar	18.4—21.7	22.2—23.9	.....	5.8—6.0	2.7—3.3	(17), (23)
Swamp black gum	18.5—18.9	26.7—29.5	.....	.....	.....	(1a)
Paper birch	21.9—28.8	17.6—26.3	77.5 81.2	5.75—6.1	7.1—7.6	(1a), (24), (5)
Red gum	17.9—21.1	21.4—23.5	.....	4.6—6.3	.....	(1a), (26)
Sugar maple	21.3—23.2	20.3—23.2	74.8 77.9	6.3—7.25	4.45—6.55	(1a), (24)
Basswood	22.1	.....	.....	6.0	5.8	(1a)

* Sapwood. † Heartwood. ‡ Included herewith are data on Eastern Cottonwood *(Populus deltoides)*.

softwoods. Our analytical data, in this case are limited, but the trend is unmistakable. We have no holocellulose analyses in the case of the black gums—but a reasonable prognosis would be that the yields of holocellulose would probably be low; i.e., in the range of the softwoods, and, therefore, typical.

Despite the fact that the lignin content of the softwoods is usually the higher, the methoxyl content of the

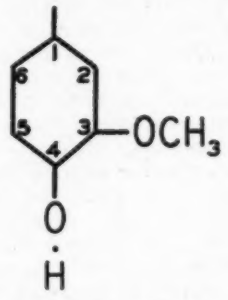

Fig. 1.—Groups present in softwoods and hardwoods.

hardwoods is ordinarily as high (or higher) than that of softwoods. This seeming paradox may be traced (as we shall show) to the fundamental chemical differences between the lignin of softwoods and that of the hardwoods. In the case of hardwoods, the per cent "acetyl" (or acetic acid) is higher than in softwoods—a fact which accounts for the higher acetic acid yields obtained from the former on wood distillation.

An important difference between hardwoods and softwoods, not shown in Table 2, lies in the mannan content (i.e., those resistant hemicelluloses which give the sugar mannose when treated with acids). Softwoods contain mannans in amounts varying from 4 to 10.5 per cent. The hardwoods never contain more than small amounts of mannan. In fact, Schorger (*27*) claims that in none of the hardwoods examined by him were there *any* mannans. This statement has been disputed by other investigators (*28*). In the experience of the writer, the mannan content of the hardwoods is always very low, and at times negligible, whereas that of the softwoods is always appreciable. This is confirmed by unpublished data of the Institute of Paper Chemistry.

This difference in mannan content is reflected in the respective chemical pulps from hardwoods and softwoods. Those obtained from conifers retain a part of the mannan present in the original wood. Hardwood pulps are practically free from mannan. Examples of pulps from softwoods may be in order. A commercial sulphite pulp (calculated on the lignin-free basis) contained 6 per cent mannan. A spruce soda pulp contained 3.3 per cent mannan, and a high alpha-pulp prepared from this same sample of soda pulp still retained about 2 per cent mannans, despite the fact that the alpha-cellulose content had risen from 83.4 per cent to 96.4 per cent during the purification. These cases are cited to show the tenacity with which this mannan is retained in the pulp, and also because sometimes a mannan content may have an appreciable effect on pulp properties. (*29*), (*30*).

Unfortunately we have no precise quantitative method for determining the hemicellulose fraction in wood. However, a few proximations are possible and the results of such calculations are interesting in that they, too, show chemical differences between hardwoods and softwoods. One of the methods for computing hemicelluloses in hardwoods is as follows: The holocellulose is determined quantitatively, and determinations are also made of the methoxyl, pentosan, and acetyle contents of this holocellulose fraction. Each of the last three determinations are calculated on the basis of the extractive-free wood. The sum of the three then gives an approximate figure for the per cent hemicellulose in the *wood free from extractives.* Inasmuch as the hemicelluloses also contain an undetermined amount of uronic acids, and inasmuch as the "pentosans" are largely "xylans," this figure is not a precise one. However, it serves for comparative purposes, and may be considered a minimal value for a specific hardwood. Table 3 gives the results of a few such computations.

Softwood hemicelluloses cannot be readily computed in this way, because in very few instances have the mannans in holocellulose been determined. If these are not considered, the values would be entirely too low. However, another possible method of computation is available. For example, let us take the case of a balsam fir that contained 69.9 per cent holocellulose (cf Table 2). The alpha-cellulose fraction of this holocellulose, *computed on the basis of the original extracted wood* was 44.0 per cent. Subtracting this, from the percentage holocellulose, we obtain 25.9 per cent, which approximates the hemicellulose content of the balsam fir. Similar computations for other pulpwoods follow: Eastern hemlock contained 20.3 per cent; jack pine, 23.0 per cent red spruce, 24.6 per cent; white spruce, 24.8 per cent. The hemicellulose content of aspen, by the same method of computation, gives 31.8 per cent, which is not too far removed from the minimal figures given in Table 3. It is obvious that *the hemicellulose content of the hardwoods appears to be consistently higher than that of the softwoods,* a finding which is in harmony with numerous unpublished data. Evidently the mannan content of the softwoods do not compensate for the very high pentosan content of the hardwoods.

Let us return now to the interesting Mäule reaction which differentiates between hardwoods and softwoods by giving a brilliant cerise coloration with the former. This is accounted for by differences in the chemical building stones of the two lignin and is correlated with the higher methoxyl content of hardwood lignin. According to the literature, lignin isolated from hardwoods contains 17-21 per cent methoxyl. That from coniferous woods ordinarily contains 14-17 per cent methoxyl. Thus it may be that a hardwood having a relatively low lignin content may still have a methoxyl content that is higher than that of many softwoods (e.g. big tooth aspen, Table 2).

Certain aromatic groups in lignin contain most of the methoxyl substituents of the wood. In the case of softwoods, 3-methoxy-4-hydroxyphenyl units (shown in Figure 1) are either present in the lignin or very easily formed from it. This it will be noted, contains only one methoxyl (CH_3O) group. The hardwood lignins contain or give rise to this same unit. *However they also contain the 3, 5-dimethoxy-4-hydroxyphenyl unit* (shown in Figure 2). It is this latter structure which is responsible for the brilliant purple Mäule coloration given by hardwoods. Compounds containing (or yielding 3-methoxy-4-hydroxyphenyl units alone give only a brownish color under the conditions of the Mäule tests. The important researches on which these facts are based are entirely beyond the scope of this paper (*31*) (*32*) (*33*). Suffice it to say that they have

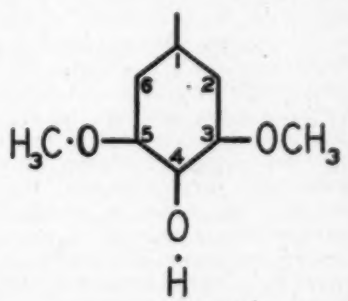

Fig. 2—Groups present in hardwoods but not in softwoods.

correlated some of the color tests of lignin with certain specific structural groups. Before leaving this discussion on the structural units in lignin, it may be well to recall that the group shown in Figure 1 is responsible for the formation of vanillin (Figure 3), which is obtained commercially from spruce sulphite waste liquors and used for flavoring purposes. Hardwood sulphite wastes also given vanillin, but mixed with it are appreciable amounts of syringaldehyde (Figure 4), due to the groups shown in Figure 2. This other by-product would be an undesirable contaminant in commercial vanillin. Hence hardwoods are excluded deliberately in this type of vanillin manufacture.

Can we go further than this group differentiation of the hardwoods on the one hand and softwoods on the other? Can one genus (e.g. the pines) be distinguished chemically from another genus (e.g. the spruces)? The results here are fragmentary. However, in the case of certain conifers some progress may be reported.

The reader may recall the pine heartwood extractives which "sabotage" the sulphite cook. These—*pinosylvin* and its *methyl ether*—were discussed at some length in a recent issue of THE PAPER INDUSTRY AND PAPER WORLD. (*34*). Up to the present, these two compounds serve to characterize the *pines*. They have not been found in any other type of wood. In fact they appear to characterize pine heartwood (*35*).

Among the minor by-products obtained in the production of spruce sulphite pulp is the so-called "sulphite liquor lactone," work on which has clarified its chemical constitution. This compound is now termed "conidendrin" and it has been fully described in a previous article in THE PAPER INDUSTRY AND PAPER WORLD. (*36*). Within the past few months, Erdtman (*37*) has shown that this substance occurs in old and in young spruce wood and that it can be extracted with acetone but not with ether. It was contained in seven out of fourteen different species of spruce wood. Those that gave negative results are not conclusively free of conidendrin, because the tests, especially in small samples of young wood, are not so easy to interpret. Four species of hemlock were examined and *all* of them contained conidendrin. On the other hand, out of seven species of fir *(Abies)* only one gave a questionable test for conidendrin. The others appeared definitely free from the compound. No conidendrin was found in the European pines *(Pinus sylvestris* and *Pinus nigra)* nor in Siberian or Japanese larchwood *(Larix sibirica* and *L. leptolepsis)*. It was not found in Douglas fir. However, a compound, pinoresinol, closely related to conidendrin, has been isolated from the oleoresins of certain pines and from certain spruces. In summary, it may be said that conidendrin is widely distributed among the spruces and hemlocks.

TABLE 3—Hemicellulose Contents Calculated for American Pulpwoods (Hardwoods)

Species	Sapwood	Heartwood
Bigtooth Aspen	29.6	29.3
Beech	31.1	29.2
Paper birch	37.0	35.7
Yellow birch	34.0	32.2

All known larchwoods contain cold-water-soluble polysaccharides that are quite characteristic, and which are termed "arabogalactans" because, when treated with acid, they give rise to two sugars:—arabinose and galactose. (*38*). Of the various species of larch, Western larch has the highest arabogalactan content. This may exceed 10 per cent of the dry weight of the wood. Related (or possibly identical polysaccharides may also be present in longleaf pine, although the amounts are probably relatively low. (*39*).

These are scattered examples of characteristic extractives which may or may not serve to delimit a certain genus. Has the chemist searched further than this? Has he succeeded in showing chemical differences between different *species* of wood? Within limits, the answer is in the affirmative.

For example, take the two important Southern pulpwoods, longleaf and slash pine. Each of these woods,

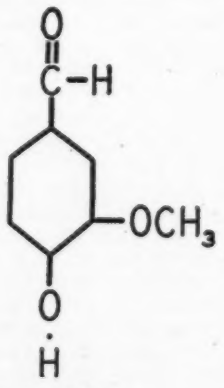

Fig. 3—Vanillin

when steam distilled, gives "wood turpentine." This contains largely alpha-pinene, which often comprises 80 per cent of the weight of the turps. Other important volatile compounds are also present. These include small amounts of beta-pinene, dipentene, the terpinenes, and terpinolene (*36*). The interesting point however is that whereas the alpha-pinene of longleaf pine is *dextrorotatory*, that from slash pine is *levorotatory* (*40*). Thus a simple physical property of one of the wood components serves to distinguish between two important pulpwoods. This is simply one case. The dextro-form of alpha-pinene is also found in red pine and shortleaf pine, whereas the levo-form occurs in White pine and in Douglas fir. The important European species, Scotch pine *(Pinus sylvestris)* gives an oil that contains not only dextro-alpha-pinene, beta-pinene, and terpinene, but also two other components, (*41*) d-Δ^3-carene, and d-Δ^4-carene, not found in our more important American species of pine. Jeffrey pine yields a totally different oil. This is very high in *n-heptane* (a product normally found in petroleum) (*42*). At present our knowledge of the oils (and other components) of the various pines is entirely too limited to furnish a key for their sharp chemical differentiation. However this possibility is not as fantastic as it may appear to be at first blush. It awaits future research.

In Australia the identification of various species of wood, has been widely studied. Specifically, chemical differentiation has been applied in the case of various species of *Eucalyptus*, a number of which are valuable pulpwoods. It was Dadswell, the Australian chemist (*43*) who emphasized the importance of seeking to identify chemically those commercial species which were anatomically very similar. Two such woods were "karri" *(Eucalyptus diversicolor)* (A) and "yarrah" *(Eucalyptus marginata)* (B). Various samples of (A) were analyzed and shown to contain 53-62.7 per cent Cross and Bevan cellulose. Samples of (B) contained 38.4-51.6 per cent cellulose. Seemingly the figures never overlapped. (A) contained an average of 0.3 per cent ash, which showed a mean alkalinity of 0.63 cc. per gram of dried wood when titrated with 0.1 *N* acid. (B) had an average ash content of 0.145 per cent and an ash alkalinity of 0.06 cc. per gram of dry wood. (A) is attacked by termites. (B) remains unattacked. Dadswell also applied these chemical identifications to other species of eucalyptus.

The methods were extended by Cohen (*44*) who made a systemmatic examination of 540 samples of 37 colored species of the Eucalyptus genus. The woods were tested for alkalinity of ash, which furnished the means for a rough separation. He

also used certain transient color reactions that proved quite useful, but which need not be discussed in detail. The tests afforded a valuable means for identification and seemed especially suited to the various species of colored Eucalyptus woods.

The foregoing studies point the way to future research. Although the anatomical features of wood—shown under the hand lens of microscope—often permit its complete identification by the wood technogolist or the botanist, there are some important ex-

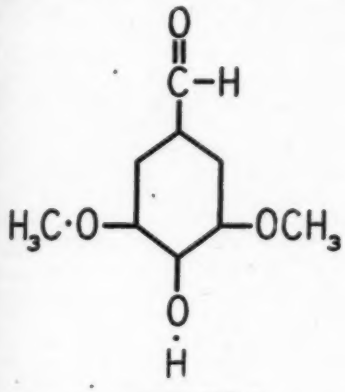

Fig. 4—Syringaldehyde

ceptions. Wood sections of red, white and black spruce cannot be distinguished from each other under the microscope. Neither can the aspens. In years to come it is probable that the organic chemist will continue to make contributions that will serve the wood technologist. At least that is our hope and belief.

Summarizing, we can state that hardwoods and softwoods may be differentiated on the basis of differences in lignin color reactions and by their respective pentosan, holocellulose, hemicellulose, acetyl and mannan contents. In individual cases, one genus may be distinguished chemically from another through the isolation of some characteristic extractive (e.g. pinosylvin, etc. in the pines). In a few cases, wood species may actually be separated from each other by chemical means. Further phytochemical investigations in this field should prove highly interesting to the chemist and very useful to the wood technologist as well.

Grateful acknowledgment is made to Miss Eda Niblen for drawing the figures used in this article.

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Industrial Hygiene in Hot Weather*

▶▶▶ THE HIGH temperatures of the summer months bring with them a number of hygienic problems in industry. The comfort and health of workers, as well as efficiency in production, depend to a considerable extent on the degree to which hot weather conditions are controlled.

In the hot summer months, a real contribution can be made to the comfort and efficiency of workers by maintaining as high a ventilation rate as feasible, with the rate of air movement within the workroom high enough to cool the occupants by rapid evaporation of their perspiration. Where air conditioning is used in product control, with necessary heat or humidity resulting in damp clothing at the end of the work day, provisions for showers and a change of clothing at the end of the shift are desirable.

Unqualified employees should not be allowed to tamper with ventilating devices provided for safety, or shut them off, as occasionally happens because some individuals prefer the natural ventilation of open windows.

Industrial dermatitis or skin affections from contact with irritating substances used in industry are more prevalent in the summer months. This problem can be met by minimizing contact with the irritating substance, either by hoods or other mechanical means; by requiring increased personal cleanliness; by use of protective clothing and protective hand creams.

In plant cafeterias, added care should be observed in the handling and refrigeration of food, and strict attention should be paid to sterilization of dishes and utensils.

Drinking water should be between 40 Fahr. and 80 Fahr., preferably around 50 Fahr. Salt and dextrose tablets are placed beside drinking fountains in a number of industries to prevent heat exhaustion.

(*) Safety Research Institute.

The Why and Wherefore of Fourdrinier Wire Records

A. A. NYITRAY
Eastwood-Nealley Corp.

▸▸▸ A WIRE PERFORMANCE record is a very interesting document When properly analyzed, it can be of considerable benefit in determining wire specifications best suited for the individual machine.

Many paper mills chart their machine clothing records on graph paper, thus revealing performance variations over a considerable period of time. These variations may indicate a trend pointing to trouble either on the paper machine or with the machine clothing. Prompt recognition of the trouble will save considerable time and increase machine production.

There are so many variables on a paper machine that individual wire life is unpredictable. Most of the variable factors are known and some of them can be controlled in practice.

The major variable factors affecting wire life are wire specifications; paper machine speeds; grades of paper and stock; seasonal changes; and paper machine conditions. Each of these factors can affect considerably the individual wire life. When two or more of the factors exist at the same time, wire life may suffer to a great extent.

Wire Specifications

During the past few years, twill weave wires have been introduced to the majority of mills. This change has had to be considered in judging wire costs and records. In the transition period, both plain and twill weave wires were used. In many cases, different twill weave constructions were tried to find the construction most suitable for each machine.

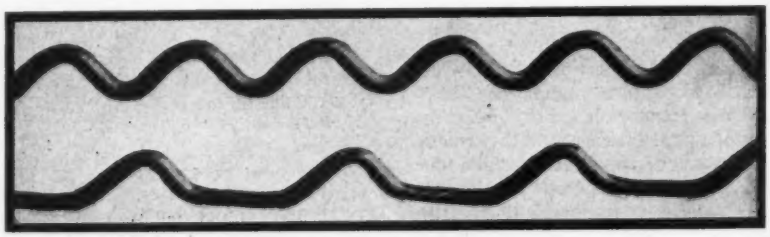
The nature of the twill weave is such that more variations in beat-up can be made than with plain weave. As a result there were many instances of two or more wire companies furnishing a different construction of twill weave wire for the same machine. This situation made it difficult for the papermaker to obtain true comparisons in wire life, formation, and finish.

The best plan was found to be the selection of a wire of a certain construction and then having wires of the same construction furnished by the wire suppliers. In this way, the papermaker was able to obtain more uniform results on the machine. It also gave him a better opportunity to judge twill weave performance compared to plain weave. In general, a twill weave wire will run longer than a plain weave. This increase in life is due primarily to the knuckle of the twill being longer than the plain weave knuckle on the wear side. A number of mills, however, continue to use plain weave wires because experience with the twill has not demonstrated any better results. The proper selection of a wire remains a problem to be solved on each machine. There is no formula, other than experience, that will enable a mill or wire manufacturer to determine beforehand the exact weave or construction best suited for each individual case. The selection of either brass or bronze wires must be made on the same basis. Here again there is no known formula for predetermining the most suitable alloy from the standpoint of resistance to abrasion or fatigue. When the *p*H of the stock is sufficiently acid to induce corrosion, all-bronze wires can be recommended.

At one time all fourdrinier wires were woven from brass warp wire. The first phosphor bronze wires were introduced in this country in 1912. Since that time the majority of mills have changed over to bronze alloys.

It is generally believed that the smaller paper machines, because of small diameter rolls, require brass wires. However, there are many small machines using bronze wires with excellent results.

Wires wear out or fail because of abrasion, erosion, corrosion or fatigue.



ABOVE—Plain weave wire knuckle. BELOW—Twill weave wire knuckle.

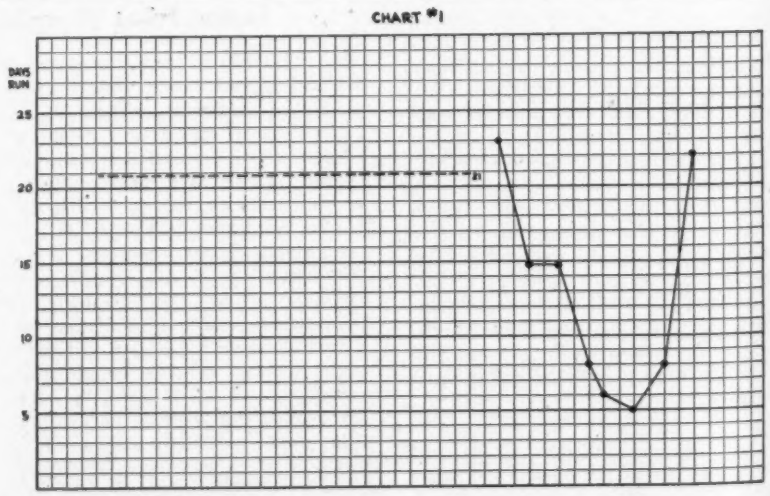


***Chart No. 1** portrays the manner by which a chart will indicate a trend and point to trouble as it develops. This illustration was taken from the records of a book machine. Several wires, all of the same mesh and weave, averaged 21 days. Then two consecutive wires ran only 15 days each and wire out more rapidly than preceding wires. This was a definite indication of trouble. Before the source of trouble was located and corrected, four wires ran only 5 to 8 days. A very abrasive filler was the source of trouble and when corrected the wire life returned to former levels.*

In most cases, it is a combination of these factors.

Abrasion is the result of friction between the wire and the parts of the wet-end over which it runs. Wire erosion is the wearing away of minute particles of metal that gradually weaken the cloth. Corrosion is a chemical action which attacks the wire alloys and causes their disintegration or destruction. Fatigue is the weakening of the wire by continual bending over rolls; and by the stresses and strains caused by the load imposed upon the wire in driving the wet-end and to overcome the force of vacuum on the suction boxes.

Grades of Paper and Stock

A major factor affecting wire life is the grade or grades of paper manufactured. News, tissue or kraft mills operating at relatively constant speeds do not have as many variables as a book or specialty mill which changes grades and weights many times during the life of a wire. Wires of 60 mesh are used for news and kraft, whereas 70, 75 or 80-mesh wires are needed in book mills. More metal is available in the coarser meshes for wear than in the finer meshes.

A free stock without filler is easier on a wire than pulp containing abrasive fillers. As the filler goes through the wire mesh, it results in some erosion. A lightweight sheet requires less vacuum than a heavy sheet. Consequently, the abrasive action across the suction boxes becomes greater as the weights of sheet and amount of vacuum increases.

The *p*H of the stock, and temperature of the water and air in the fiber suspension also influence wire life. Corrosion increases with a rise in temperature or degree of aeration in the water.

Certain stock or water conditions cause a scale to be deposited on the wire and in the mesh. This scale not only decreases the drainage, which means an increase in vacuum for water removal, but it also shortens the life of the wire due to increased erosion.

The chemicals used for bleaching pulp, when present in the stock flowing on the wire, will bring about corrosion. This corrosion results in dezincification of the brass shute wires.

Machine Speed

The speed of a paper machine also plays a very important part in wire life. A 60-foot wire running 600 feet per minute will make ten complete revolutions per minute—600 per hour —14,400 during a twenty-four hour day. The same wire operating at 900 fpm will turn over at the rate of 900 revolutions per hour—21,600 per day —an increase of 50 per cent. Theoretically, on this basis, twenty days life at 900 fpm is equal to thirty days at 600 fpm. As machine speeds increase, a decrease in wire life can normally be expected. The production per wire, however, may be as great or greater than at lower speeds. Naturally increased tonnage per day means greater return per invested dollar.

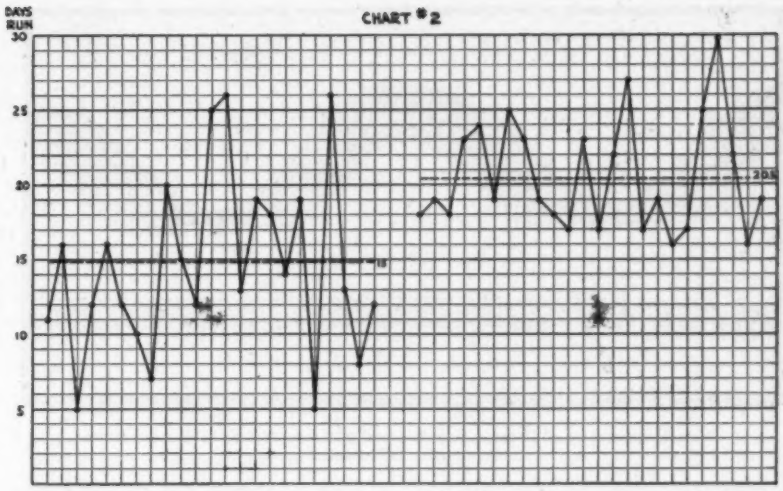


Chart No. 2 illustrates excellently the variations in wire runs obtained on a tissue machine when different meshes and weaves were used. On the left hand portion of the chart is plotted 23 consecutive wires exactly as taken from the wire record book. Wires of 70, 75 and 80 mesh, some plain weave and some twill weave, were used. The 23 wires averaged approximately 15 days and the range was great although some of the short runs were due to accidents. A conference was held between the paper mill superintendent and the wire manufacturers and a 75/58 mesh twill weave construction was selected. On the right hand portion of the chart is plotted 23 consecutive 75/58 twill weave wires. There were a few accidents but the average life increased to approximately 20.5 days and the results obviously were more uniform.

The length of the fourdrinier wire is not always taken into consideration with increased speed of operation. A 60-foot wire, for example, has a distance of approximately 20 feet from the breast roll to the first suction box; and the sheet of paper has to be formed in this area. On a machine running 600 fpm, the time for traveling from the breast roll to first suction box is 2.0 seconds. If the speed is increased to 1,000 fpm, with a wire of the same length, only 1.2 seconds are available to form the sheet. This difference means 40 per cent less time. Therefore, vacuum must be increased on suction boxes to obtain adequate water removal; and this higher vacuum incrases the rate of wear on the wire as well as the element of fatigue because of the higher driving load.

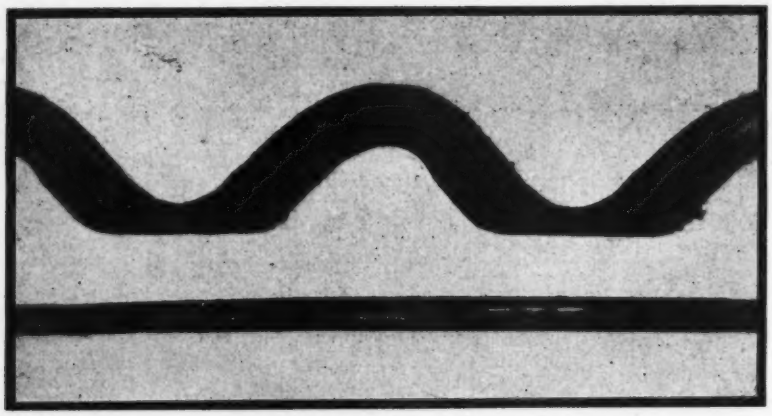
Paper Machine Condition

Obviously one of the most important factors affecting wire life is the mechanical condition of the paper machine. The Fourdrinier should be kept in first-class operating condition at all times. All parts of the machine, extending through or over the wire, should be kept clean to prevent stock, scale, rust or any foreign matter from damaging the wire. All the rolls should be checked for proper alignment and should be reground when they become pitted or worn. The suction box covers should be resurfaced when necessary as grooves will score the wires. Bearings must be kept well lubricated and maintained in good condition so that all rolls will turn easily and freely.

When a major change or repair is made on the wet-end of a fourdrinier, it should be entered on the wire record or chart. The installation of a suction roll to replace a plain bottom roll with jacketed top couch will change machine operating conditions. As a rule, better wire life is obtained with the suction roll. Operating conditions also are altered by installing new bearings or new table rolls, or by regrinding the couch or breast rolls. All of these facts are pertinent for the correct interpretation of the records to determine wire performance before and after changes are made.

Seasonal Changes

Wire life varies with the seasons in some parts of the country. Many mills report that longest life is obtained during the winter months and decreases as the temperatures rise. Some mills use a coarser mesh of wire during cold weather than in summer because of the difference in seasonal drainage factors. The principal reason



Woven warp wire of 80-mesh wire (above) and human hair (below) of same magnification for comparison.

for the variation in wire life with the seasons is the element of corrosion.

Briefly, the different forms of corrosion are direct chemical action, pitting and galvanic action, and de-zincification and corrosion cracking combined with fatigue. The three rate factors that affect corrosion of wires are acidity, temperature, and air saturation. The rate of any of the forms of corrosion is affected by one or more of the rate factors.

Paper mills operating with a constant acidity or *p*H through the year will show increased corrosion of wires as the temperature of water rises. During periods of low water or drought, corrosion will affect wires when there is an increase of air saturation in the water. Galvanic action is also increased by rises in temperature or air agitation. Mills operating with alkaline solutions may have failures due to galvanic action. A rise in temperature plus the presence of air in the water will bring about de-zincification. Corrosion cracking combined with fatigue is a type of corrosion that may be present at all times.

When any of the above operating conditions exist, the performance of wires should be judged on a seasonal basis. A true comparison cannot be made of wires used in the summer time with those operated during cold weather.

Methods of Keeping Wire Records

Paper mills employ many methods for keeping their wire records. The principal methods are

1) Calendar days on machine
2) Operating days on machine
3) Production and cost per ton
4) Distance wire travels in miles
5) Production per square foot of wire

All of these methods have some merit but individually they do not tell the complete story of the performance of a wire. Although the operating days method is more accurate than the calendar days method, it is not entirely adequate. It does not reveal down time for order and color changes, wash-ups, repairs or variations in operating speeds and weights of paper. On the basis of days life, a wire that ran twenty days at 600 fpm is comparable to another which ran thirty days at 400 fpm making the same grade of paper.

On a book machine, one wire may run thirty days when producing medium weight papers with no abrasive fillers. The next wire may run only fifteen days because of heavier papers loaded with filler. Both wires would be comparable on the basis of service rendered. The total number of operating hours is probably the most accurate method for determining wire life when operating time is the only basis to be used.

The method covering tonnage taken off a wire also does not allow for discrepancies, such as breakdowns, order changes, or other similar conditions. For example, one wire on a newsprint machine may run twenty-five days during which time conditions are normal and production flows smoothly from the machine. The next wire may encounter periods of trouble with stock and a quantity of paper comes off as broke. In this latter case, the record will show less total tonnage produced in twenty-five days. The second wire traveled the same distance as the first; yet its record is not considered comparable because of the lower amount of production.

In book or specialty mills, the production obtained from wires may vary widely because of numerous changes in basis weights and fillers. A tissue wire has to run a considerable length of time to produce the same total tonnage that a book machine wire produces in any given period.

The variable factors pertaining to the production method for judging wire performances also applies to the cost per ton method.

Many mills have made extensive studies of wires. Some of the mills have concluded that pounds of paper produced per square foot of wire is a satisfactory yardstick. Other mills believe that the distance in miles that a wire travels is a sound basis for judging wire life. The number of miles a wire travels can be computed easily by any one of several methods. For a machine running at constant speed, the following formula is applicable:

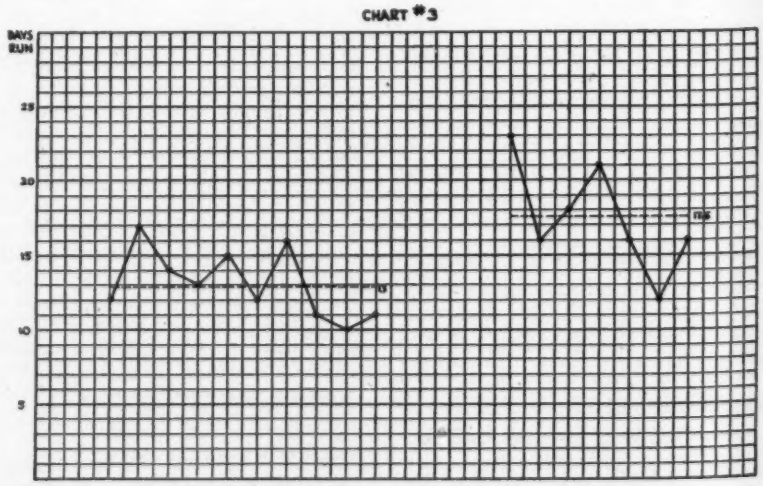


Chart No. 3 records the difference in wire performance on a book machine before and after the installation of a suction couch roll which replaced a plain bottom roll with jacketed top couch. Bronze plain weave wires of 75 mesh were used throughout this period. The ten wires, preceding the installation, averaged 13 days (including accidents). After the new suction roll was installed, the next seven wires (although two of them were damaged) averaged 17.5 days.

$$\frac{\text{Machine Speed X 1440 X Life in Days}}{5280}$$

Machine Speed .....ft. per min.
1440 .....No. minutes, 24 hours.
5280 .....ft. in one mile.

For a mill using total operating hours instead of days, for wire life, the formula is:

$$\frac{\text{Machine Speed X 60 X Total Life in Hours}}{5280}$$

A machine running at variable speeds requires a revolution counter installed at the suction couch roll. In such a case, the formula becomes:

$$\frac{\text{Total No. Rev. of Couch Roll During Life of Wire} \times \text{Circumference of Couch Roll}}{5280}$$

In the final analysis, any method suitable for keeping records should be simple and understandable and should require a minimum amount of time for posting.

Mill managers and operators are primarily interested in production and costs. Both figures are needed for accounting and cost purposes and are, therefore, available for wire records. These figures and the distance a wire travels will enable the papermaker to judge wire performances within a reasonable degree of accuracy. All three figures can be posted on a chart in a few minutes, thus giving a visual record that is available at all times. If the chart is followed carefully, it will reveal any unusual trend, thus permitting steps to be taken to correct trouble before resulting in serious difficulties.

Practically every wire record will show that wire life varies as much as 100 per cent; yet wires, like paper, are manufactured within very close tolerances and do not vary as much as 10 per cent in quality. It is customary to think in terms of average wire life. Chart No. 3, for example, records ten wires running from ten to seventeen days, with an average of thirteen days. Therefore, wires on this machine are judged against a thirteen-day average. Actually it would be better to think in terms of wires running within a range of days rather than an average. In the example just cited, on this basis wires running between ten to seventeen days would be considered satisfactory.

The paper industry should adopt a uniform method of keeping wire records. If this action could be accomplished, paper mills producing the same grades of paper would be in a position to compare wire costs and wire performances with each other.

Remember that a wire that runs trouble-free until worn out has rendered complete service.

New Types of Paper for Government Service*

M. S. KANTROWITZ[1] and E. W. SPENCER[2]

▸▸▸ THE ENTRY of the United States into war was closely followed by the necessity of controlling commodities and prices as a bulwark against financial inflation.

After the establishment of the Government Office of Price Administration and the War Production Board to effect these purposes, ways and means were designed to bring about the desired results through a program of rationing.

To protect this newly conceived rationing program against forgery and failure, it became desirable to create new types of paper for printing ration stamps, so constructed as to make duplication extremely difficult and costly. Such a base paper was made to contain secret identification characteristics which would positively establish its genuineness under scientific tests.

Ration Paper

The special papers developed to print stamps for the rationing of gasoline and food commodities are of a highly technical nature.

In the printing of War Ration Book No. 1, for sugar rationing, precaution was taken to prevent the counterfeiting of stamps by incorporating into the paper structure certain secretly identifiable characteristics somewhat similar in appearance and pattern to that of currency paper, but not visible to the unaided eye in ordinary light.

The Eastern Seaboard gas rationing paper consists of a white sheet, the printing surface of which is tinted a blue-gray color and processed with a design which changes color under certain conditions. The back of this sheet is unprinted and unprocessed, so that its whiteness is not affected. This design or pattern which is very sensitive to chemical reaction consists of eagles superimposed on a background made up of the words "U. S. Gasoline Ration" interspersed with horizontal wavy lines, spaced so that identifiable parts of the design appear on every stamp.

The device used to effect the design is furnished by the contractor and becomes the property of the United States and must be delivered to the Public Printer or his authorized agent whenever demand is made therefor.

For nation-wide gasoline rationing, for fuel oil rationing, and for War Raton Book No. 2, certain additional features were incorporated into the paper. The appearance of the printing surface of this safety paper is similar to that of the Eastern gas rationing paper but of slightly darker blue-gray color. The paper itself is a light gray writing paper, having incorporated into its structure, as in the case of War Ration Book No. 1, certain identifiable characteristics. The processed over-all design is color-changeable by laboratory methods as in the case of Eastern Seaboard gas rationing stamps but is slightly different in arrangement. The words "U. S. Government Ration" run vertically across the sheet followed by a star, and the wording is separated from the recurring words above and below by three wavy lines. The surface texture of the unprinted side of this paper is so treated that it may be readily identified by a chemical test.

In connection with the printing of war ration books, the Technical Division of the Government Printing Office engaged in research to develop a low cost process for manufacturing identifiable paper employing specially prepared cellulose fibers.

At the time the orders were issued for the printing of war ration books Nos. 1 and 2, these experiments had

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(1) Technical Director, (2) Assistant Technical Director, United States Government Printing Office.

not progressed to a point warranting their incorporation into the process for making the base paper for these books.

The base paper used for printing subsequent ration books, beginning with War Ration Book No. 3, has made use of such chemically treated cellulosic fibers. This base paper is similar in color, design, and general appearance to that of Book No. 2. However, it differs in the fiber composition. The characteristics of these fibers constitute potential identifying means when the paper is subjected to the application of certain chemical reagents. This type of paper has never before in the history of papermaking been commercially produced.

It was found that, by incorporating into the paper cellulose fibers specially treated to develop their distinguishing characteristics upon application of suitable chemical reagents, certain advantages over the previous type of ration paper were obtained.

One of these advantages consisted in the fact that the invention became practical for use in the field without requiring expensive laboratory testing equipment.

The skill of a chemist or technician is not necessary, but a layman when properly instructed can detect the presence of these fibers. Another advantage is that the chemically treated fibers do not lose their effectiveness upon exposure to sunlight, bleaching agents, acids, alkalis, water, oil or gasoline, and they therefore remain in the paper structure as a permanent means of identification.

A third advantage consists in the fact that the chemicals required to treat these special fibers are not strategic to the war effort, and therefore do not require priority ratings for their procurement as did the materials needed for the production of the paper used in the preceding war ration book.

An additional advantage appears in the low production cost of this special manufacturing process, the knowledge of which has been confined to only four paper mills which received contracts for the production of rationing base paper. There is another safeguard to counterfeiting added by restricting the production of this paper to only a few mills and its manufacture is attended by greater uniformity of the final product. The greater the degree of uniformity of the paper, the more certain is the determination of the genuineness of the stamps. Variation in the characteristics of the paper would offer inducements to forgery through taking advantage of the difficulty of positive identification.

The process of manufacturing the final type of ration paper may be divided into two parts; the manufacture of the base paper in a paper mill and the processing of the safety design in a converting plant. Exacting methods of control are used both in the manufacture of the base paper and in the processing of the design.

The Government furnishes the manufacturers of the paper with the chemical materials and complete instructions and supervision for properly mixing them to produce the desired effects. It is essential that paper of this type be manufactured in accordance with unchanging standards. For this reason the Government maintains inspectors at the manufacturing and processing mills who are required to inspect and test the paper during the course of manufacture to assure that it is up to standards in all respects. The paper is constantly checked for physical characteristics such as bursting strength, weight, sizing, and thickness, and for the safety features embodied. Any paper which does not meet the standards in any one of these respects is immediately rejected at the source.

The paper contractors have instituted elaborate guarding systems to insure that no ration paper manufactured by them may fall into the hands of unscrupulous persons.

The Secret Service considers this paper in the same category as National currency paper. This is not an exaggerated comparison since ration stamps printed upon the ration safety paper must be used together with money as a medium of exchange for articles designated by the Office of Price Administration in the United States Government rationing program.

War Prisoners' Paper

In accordance with International Law, prisoners of War are permitted to write twice every month to their relatives or friends at home.

To guard against the sending of secret messages by War prisoners by means of writing with invisible or sympathetic inks, the War Department presented the problem to the Government Printing Office to procure paper which would immediately develop writing with invisible inks into a visible form without the application of heat or chemical reagents.

After some research with laboratory sheets, the Division of Tests and Technical Control developed specifications for a coated paper, color sensitive to all water solutions which constitute invisible inks of either the acid or alkaline types. Among such substances are the citric acid of lemons, the lactic acid of milk, starch solution, sodium bicarbonate or baking soda, sodium carbonate or washing soda, or other substances which might be employed for secret message writing and might be commonly obtainable in prison camps.

These substances are most commonly used for purposes of making secret writing inks since they are more widely available than certain other compounds which might be utilized by experts in writing secret messages. In other words, such substances as washing soda (sodium carbonate) or baking soda (sodium bicarbonate) or lactic acid (found in milk) or citric acid (an ingredient of lemon juice) might be easily obtained in War prison camps as common household commodities; and, in water solution these substances, in low concentration would make sympathetic or invisible writing inks. It is to be noted that some of these listed substances are alkaline and some acid in their reactions.

The sensitively coated paper which was first utilized in our experiments, consisted essentially of a paper base, coated with silicates or clay containing a chemical substance in the form of a mechanically incorporated powder or dyestuff, which reacted when moistened or when written upon with an acid water solution to produce a green color. This paper did not react, however, to produce distinctly visible writing with alkaline substances in water solution. Our search, therefore, led us to incorporate into the paper coating a second element which would react with alkaline solutions to produce a red coloration when the sympathetic or invisible ink happened to be of an alkaline nature.

The paper manufactured on this plan immediately showed up the writing with acid or neutral invisible inks in green color and with alkaline invisible inks the writing appeared in red.

Concerning the permanence of these developing colors, surveillance tests have shown that they will last four months and surely a sufficient length of time to be clearly detected by censors. It is clear that the advantage of this device lies in the fact that a prisoner of war may be permitted to freely write upon this specially prepared so-called "Sensicoat" paper, a name given by the chemists of the Government Printing Office to describe the sensitive nature of its coating. The prisoner of war may write upon this paper with any kind of visible ink but cannot use any invisible writing inks since all solutions—acid, neutral or alkaline or even plain water itself, will develop color when brought into contact with the paper.

This paper has for the first time in paper making history been manufac-

tured on a production basis on specifications developed by the Division of Tests and Technical Control, for the printing of postal cards and stationery ordered by the War Department for distribution to war prison camps as an absolute protection against the transmittal of secret messages by prisoners of War.

Postal cards and writing paper for exclusive use in transmitting War prisoners' messages are now printed with directions for their use in three languages—Italian—Japanese—and German.

This paper, as originally developed, was a fifty-six pound coated sheet, (basis 17x22 inches per 1,000 sheets), with the color sensitizer incorporated into the coating. The high cost of this paper, its heavy weight, and the faintness of the color produced with some invisible inks were factors influencing our decision to develop a lighter, uncoated, and much less expensive paper.

The requirements for such a paper were severe. It was to be an uncoated stock, strongly sensitive to writing with all types of solutions which could be used as sympathetic inks, as unreactive as possible to humidity and ordinary handling, but nevertheless capable of being manufactured at a substantially lower cost than the first paper used for this purpose.

Considerable intensive research revealed ways of meeting these requirements.

Samples satisfactory from a laboratory standpoint were made up and approved by the War Department which then notified the Government Printing Office that an order of stationery involving millions of sheets had been executed and was to be made by our new process. This necessitated immediate action on the transformation of the process from the laboratory to the much more complicated production scale and involved selecting the fastest and most economical method of applying the sensitizing formula which would give an essentially white sheet and high color sensitivity to liquids containing water applied from a pen.

It was finally decided that the rotogravure press and the aniline press would both be satisfactory from those standpoints and, to further simplify and economize on the paper's manufacture, search was made for a manufacturer who could make the base paper, sensitize and print it simultaneously, and then cut the forms and cards to the desired size. Although mills of such versatility are rare, we found one paper manufacturer with not only these facilities but also having an ink department fully equipped with modern high grade ink grinding mills and a very good research laboratory.

This mill was contacted and readily agreed to lend its facilities to the experimental work necessary to the changeover from laboratory to plant production basis.

A series of laboratory and plant experiments were made ending in a completely satisfactory paper which could be made from start to finish, including the grinding of the special dye, in the one plant.

We have termed the new paper "Analith" War Prisoners' Stationery to differentiate it from the original "Sensicoat" War Prisoners' Stationery, now discontinued.

V . . . — Mail Writing Paper

When the V . . . — Mail service was inaugurated, the War Department requested the cooperation of the Government Printing Office in developing a paper suitable for overseas correspondence of the Armed Forces. This purpose demanded of the paper sufficient strength for transmittal through the mails and proper color for photographic reproduction upon miniature film. There is also required a certain degree of endurance to handling in order to insure safe arrival when mailed directly. The red printed matter on the forms must be such that it will reproduce well photographically. The paper must possess sufficient brightness and opacity to produce good contrast with writing ink and not permit undesirable "show through."

The composition of the paper is made up of approximately 30 per cent groundwood pulp and the remainder bleached chemical wood pulp.

In order to avoid difficulties arising from strike-through of the printing or writing, the opacity is specified to be not less than 93 per cent as determined by the contrast ratio TAPPI method T425m.

The brightness of the paper must be between 66 and 70 per cent as measured by the General Electric or Hunter Reflectometers or other instrument conforming to TAPPI standards outlined in standard method T452sm. If the specified brightness and opacity cannot be obtained based upon the fiber content alone, it is stipulated that sufficient filler, such as titanium dioxide, should be added to the paper in the course of manufacture to obtain the specified values for these characteristics.

Characters written with ink must be clear cut without feathering and this quality of the paper is determined by testing it with an ink consisting of an aqueous solution of a dyestuff. Good erasing quality is assured by specifying "the retention of good writing quality and appearance of surface after erasure of written characters."

Because of difficulty experienced in photographically recording letters written with hard pencil and especially finely written characters in order to obtain the largest possible message in the alloted space, it is necessary that the paper be suitably sized to obtain clearly visible characters written with a relatively hard pencil.

Fluorescent Map and Chart Papers

Certain substances are said to show fluorescence when they convert invisible ultraviolet light, commonly known as black light, into visible light of different colors, according to the nature of the substance upon which the ultraviolet light falls. Fluorescence continues only during the period in which the ultraviolet light is shining upon the material.

The cause of fluorescence lies in the pigments or dyestuffs which are classified as either organic or inorganic. Some organic pigments and dyes possess high fluorescent brightness and brilliant color but are subject to fading and loss of fluorescence on exposure to sunlight. The inorganic pigments, the class most commonly used, consist of zinc sulphide or zinc and cadmium sulphide.

Inorganic zinc sulphide or zinc and cadmium sulphide pigments can be ground on roller mills to make satisfactory printing inks; they can be dispersed in the coatings of paper or they can be incorporated into the structure of the paper itself.

Although fluorescent printing inks have been made for use in letterpress printing, it has been found more effective to resort to other printing processes. In the printing of fluorescing tables or other data on a black background, the bronzing or dusting method of printing has been utilized. In the case of instrument dials and other pieces of equipment where indicating scales are required, the silk screen process has been successfully used.

The adoption of fluorescence for war uses has involved the printing of millions of fluorescent aeronautical charts.

The first fluorescent charts were printed by the offset process on ordinary map or chart paper using fluorescent inks of a wide range of colors. Later charts were also printed with ordinary offset inks on specially coated paper which itself fluoresces.

The special care necessary in handling the fluorescent inks, the low resistance of the paper to handling, and the ease of destruction of the fluorescent coating by erasure, led to the development of a higher quality lithographic chart paper in which the fluorescent properties have been incor-

porated into the structure of the paper itself. With this newly developed paper, the printing of aerial navigation maps or charts now involves no special or new technique for the lithographer. Any desired detail can be printed by offset using the customary lithographic inks. The entire paper sheet becomes luminous under ultraviolet or black light and so brightens the printed matter that it may be easily read in the dark.

High Wet Strength Paper

Certain war purposes necessitate a paper possessing high strength and scuff resistance when wet. Such a paper is required for printing maps and training and instruction manuals for the Armed Forces for use under severe conditions not only on the ground but also in planes, tanks and ships. It must, therefore, resist the effects of salt water, or rain water, or perspiration when carried by the sailor or soldier, as well as the grease and grime associated with motor vehicles.

To meet these unusual war conditions, it was necessary that the specifications for this type of paper include physical properties to provide for such extraordinary resistance. These physical properties include high folding, tensile, tearing and bursting strengths; high retention of wet strength; resistance to scuffing and abrasion when wet, good erasing qualities when either dry or wet; good opacity under dry or wet conditions; minimum expansion and contraction; and good printing quality.

High wet strength papers may be produced by treatment of the paper fibres with insoluble resins such as melamine-formaldehyde or urea-formaldehyde resins in the beater or at some other point of application in the paper making operation prior to sheet formation. When the resin is mixed with the paper stock, it attaches itself uniformly to the fibres and forms such a close bond that it cannot be washed free.

The application of melamine or urea-formaldehyde resins to paper fibres increases their wet strength from almost zero to about 50 per cent of their original dry strength as measured by the bursting and tensile strength after soaking in water for one hour at a controlled temperature.

Such a drastic laboratory test is indicative of the capacity of paper so formed to withstand the severe treatment to which it must be subjected during its field uses in the War.

50 Per Cent Rag Nautical Chart Paper

The Technical Division of the Government Printing Office co-operated with the Coast and Geodetic Survey and the Hydrographic Office, at their requests, to develop a 50 per cent Rag Nautical Chart Paper. This paper is used by those branches of the Government for printing nautical charts of supreme importance in the prosecution of the war. The paper characteristics requisite for this type of printing are:

(a) Printing qualities involving low factors of expansion and contraction, and a uniform surface finish to permit the register of four or five colors with hair-line precision when printed by the offset process;

(b) Good erasing quality permitting corrections to be made with India ink directly on the chart;

(c) Durability, since such charts must be handled and folded frequently.

Suitable specifications to obtain such a grade of paper were prepared and included for the first time under Lot No. 68 of the Government Printing Office Paper Schedule, effective April 1, 1943.

Some Forest Problems *of the Pulp and Paper Industry*

B. F. AVERY, Manager, Woodlands Department
The Great Lakes Paper Company Limited

▸▸▸ MANY SERVICES AND COMMODITIES, while less essential to life than water, contribute much to human comfort and happiness and are accepted as continuing benefits without thought or effort by a large number of the beneficiaries. When such benefits are curtailed or disappear, resentment is a common, perhaps a very natural result.

Informed people may be expected to prepare themselves to meet the experience of curtailed supplies or, if by their action supplies can be maintained, to take action toward their maintenance. The public cannot be held responsible for a catastrophe if it is not informed of the conditions that threaten the disaster. Resentment is the public's chastening rod for those who knew and did not tell.

The North American continent has enjoyed the benefits derived from the forest for so long that many far removed from the source of the raw material, have forgotten, if they once knew, that the newsprint of the newspaper, the leaves of the book, the page of the magazine, and many familiar items of daily use only yesterday existed as trees.

Not to have newspapers, books, magazines, and the hundred and one items of wood fiber that are woven so inextricably into daily living is unthinkable. And yet if thought is not taken, these commodities of forest origin will flow in diminishing volume and there will be great resentment because of that fact. For there are problems connected with the growing and harvesting of trees, both immediate and long term, that the public should understand.

The pulp and paper industry is, in the main, not only a manufacturing industry, a converter of wood, into usable products, but also a producer of the raw material that it manufactures. If the raw material can be supplied, the flow of products can be maintained.

The chief immediate problem facing the industry is a supply of woods labor sufficient to produce and deliver the pulpwood required to feed the mills. There are trees available to be cut but under war conditions men

must be directed by the established manpower authority to that work most essential to Victory. The pulp and paper industry is considered of great importance in the war effort of the Allied Nations, but the industry may, nevertheless have the merit of only such number of men as may be assigned to it. For the past three years, this number has been too few to provide sufficient wood for capacity production by the industry. The result has been a diminishing flow of products in spite of the elimination through use of normally essential block pile reserves.

The problem of woods labor supply is not a small one. A description of the operations required to supply a unit plant of the industry might serve to clarify it. Assume a plant capable of producing one hundred thousand tons of newsprint and forty thousand tons of excess sulphite pulp per year. Such a plant will consume one hundred thousand cords in newsprint and seventy thousand cords in sulphite manufacture, a total of one hundred and seventy thousand cords. A cord of wood, in the rough, weighs about two and a quarter tons. To cut, pile for measurement, load on sleigh or trucks, unload to water or load to cars and unload to mill conveyor represents the handling of 582,500 tons from three to five times depending on the method of transportation, if by water 1,747,500 tons, if by rail, 2,912,500 tons.

In the cutting and transporting of one cord of wood from the stump to the mill approximately one and three-quarters man days are consumed. The production and delivery of 170,000 cords will require approximately 297,500 man days. Allowing eleven months or 286 days in a working year in the woods, this one plant needs 1,040 men in the woods continuously.

In 1944 the United States received a supply of 3,264,000 tons of newsprint or more than 32 times the newsprint production of the unit mill described. The wood required for such a supply represents a year's work for 20,000 skilled woodsmen. If the labor available is unskilled, twice that number would be required.

Labor supply for the woods is an immediate problem of the industry. It can be solved only in the degree that men occupied in work of a somewhat seasonal nature, such as farming, construction, lake transportation, are directed in the "off season" by the wartime manpower authority to woods work. Many mills are running at less than capacity in 1944 due to the lack of adequate manpower to produce the required quantities of pulpwood.

The problem of supply is less acute than that of manpower, but it is nevertheless a problem of immediate importance. The difficulties of supply are also of wartime origin. Tractors and trucks, rubber, gas and diesel fuel; chain cable and rope; saws, axes, frames and handles; boots, shoes, cotton and woolen goods; canned vegetables, dried and canned fruits, butter, sugar, tea, coffee and meat, all are essential to woods operations and all from time to time due to wartime conditions, are available in less than the usual and required amounts, or are of less than the usual and required quality. Lowered production and increased costs are the result.

These problems are immediate but they will pass when the war is won. The industry will then face and must solve the larger problem of self-preservation.

The foundation of the industry is the forest and the foundation of the forest is land. The land has a certain capacity to grow trees and the minimum area that must be dedicated to tree growth and supported by the industry is that area on which the annual growth or drop of wood is sufficient to provide the established mills with their annual pulpwood needs.

The capacity of land to grow trees can be determined within reasonable limits. The area of forested land required for the industry or for any unit within it can be calculated. A shortage of land growing trees for a pulp and paper mill is as certain death to that mill as is a shortage of food to a heard of cattle. On an overstocked range the deaths are not limited to the latest born calves.

The beginning of the solution of the problem of preservation or continuation of the pulp and paper industry is the allocation of adequate land to supply its raw material. Land costs money not only to acquire, but also to protect and to develop. The industry must assume this expense as a legitimate cost of its products and the ultimate consumer must accept this cost in the price paid to the manufacturer if he wishes the products to continue to be provided.

Land area alone will not maintain the industry. It must be protected, developed and handled with care. Forest protection, particularly protection against fire, has received increasing attention in recent years, but fires still occur and are a serious menace to maintained production. Of even greater import are the recurring epidemics of tree killing insects of which the spruce budworm now causing colossal damage to spruce and balsam in Northern Ontario, is a striking example. Insects, like fire, recognize no boundaries and their control, therefore, is of national, in fact international concern.

All protection efforts are facilitated by the development of communication systems, the most important of which are roads. Modern road building machinery has done much to stimulate the construction of graveled highways in forested areas but roads must be very greatly extended before there will be a sound foundation for forest culture. Theoretically there should be one quarter mile of all weather road and at least one mile of secondary road for every square mile of forest land. While the yield of forest land varies considerably, it may be assumed that the mill requiring 170,000 cords of wood per year can be supported by the production from 2000 square mile of timber limits. Such an area requires for reasonable development, 500 miles of all weather roads and at least 2000 miles of secondary roads. If fifteen hundred dollars and two hundred and fifty dollars per mile respectively are allowed for the two classes of roads, the sum of $1,250,000 will be needed for road development alone within the 2,000 square mile area. Such a road system, however, will make possible, not only greatly improved forest protection, but also the beginning of improved operating practices which are essential to the maintenance and to the improvement of yield.

Land must have growing stock, trees, to yield wood. When the trees are cut, unless the growing stock is renewed by reproduction, yield ceases. The harvesting operation may be highly efficient, the cost of wood delivered to the mill may be relatively low, but unless the growing stock on the land from which the wood came is renewed in the operation, the life of the mill is doomed. That reproduction of the desirable trees be obtained on cut over land is the concern, not of bondholders and stockholders, but of every person whose life and livelihood is affected by the continuing flow of pulp and paper products to their natural and essential uses.

Until the war is won, manpower and operating supplies will determine the volume of pulp and paper products available for distribution. When the war is over, the maintenance of the flow of pulp and paper will depend upon the interest of the public in sound forest policy and in its willingness to bear, in the price of pulp and paper products, the difference in cost between constructive forest management and destructive exploitation.

LEFT—High-tiering with all rolls in horizontal position. RIGHT—Handling newsprint rolls this way is hard on both men and paper.

Paper Handling Methods which Reduce Spoilage

Prepared under the direction of C. B. Cook, vice president, The Elwell-Parker Electric Company.

▶▶▶ A RECENT STUDY OF power industrial trucks equipped with roll handling cradles, in operation at paper mills, warehouses, and newspaper printing plants, has shown that it is possible to reduce transit and handling damage practically to the vanishing point by mechanical handling. Under war emergency conditions this would be the equivalent of recovering an appreciable portion of the paper supply of which many newspapers have been deprived due to the necessary curtailment.

Before examining specific phases of mechanized roll handling it seems pertinent to observe that although the saving of paper is of prime importance now, when a near-scarcity of paper exists, a return to peacetime conditions will find managements equally interested in the savings of dollar. Further, waste savings accomplished by using a roll handler are impressive on their own account, but they actually are secondary to the larger savings in handling time and storage.

The whole subject should be approached properly with an understanding that careless handling of rolls is bound to result in waste due to damage, regardless of the system used. Also, that newsprint is subject to damage from the time it leaves the paper machine until it arrives at the press room. The roll handler simply makes it possible to transport the rolls at relatively high speeds from station to station with minimum hazard. Rolls are picked up from the floor or from stacks in either vertical or horizontal position and they are set down on floor or stack in either position. The handling is a one-man job, and the roll is protected in transit by the sturdy steel cradle.

In other words, when a roll is to be up-ended or laid down it does not have to be tipped on its edge, which is a very common cause of damage through manual handling. Picking rolls neatly off from the stacks, instead of letting them tumble down, takes care of the second most serious source of damage. With the mashing of roll edges and the bruising of rolls by tumbling eliminated, there remains only the observance of ordinary care and common sense to prevent injury by collision with columns and other similar obstructions.

One case study of application where quite large quantities of paper are involved will indicate how nearly the theoretical zero in damage is being realized in practice. The paper mill in this case has ten machines working around the clock. A train shed having two parallel tracks is located 50 feet from the battery of paper machines. Cars are spotted so that rolls can be transported by power trucks through a car on the near track to reach a car on the far track. The shortest possible haul, therefore, is 50 feet, and the longest haul is about 250 feet.

Each roll is picked up neatly from the header and deposited in position

in the freight car without injurious bumping or tipping. Steel strapping holds the rolls firmly in place. Five power trucks load the output of this mill—1,520 long rolls daily. The capacity of one truck under these conditions is estimated at 340 rolls in a 24-hour day. That is what three men can do in a full day, one on each shift. Stated another way, one operator can take away and load an average of better than 14 rolls per hour. The mill engineer states that an experienced and careful operator can do this with 0 per cent mill spoilage.

Barring wrecks or other extraordinary happenings, the paper arrives at destination in perfect condition. The next transfer is from freight car to printing plant by street truck. One printing plant manager investigated this step and determined that in his case a very large portion of transit damage occurred at this stage. Arrangements were therefore made to put the situation under better control by sending a roll handling truck to the terminal and do the unloading with it. The power truck takes the rolls from the car, transports them along the dock and places them unharmed in the street truck. Arriving at the plant they are unloaded onto a drop which delivers them to basement storage. Intra-plant transportation is provided by various combinations of operations utilizing power trucks, lifts, elevators and dollies running on an industrial track sunk in the floor.

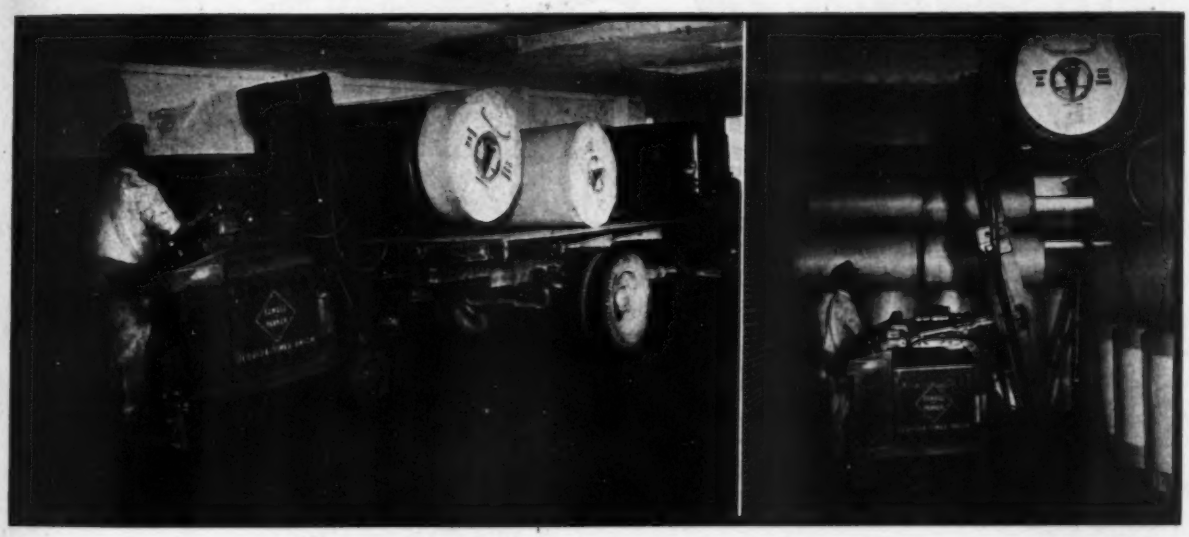
In this case the picture is one of mechanical handling all the way from the paper machine to the printing press, with every source of possible damage, except carelessness, eliminated. The system has worked out very well. Before it was adopted the printing plant records showed handling and transit damage amounting to 8/10 of one per cent. This spoilage has been reduced to 1/10 of one per cent. On an annual consumption of 5,000 tons the paper saving is about three tons per month, and the dollar saving through reduced damage alone is over $2,000 per year.

Some differences of opinion are found with regard to preferred methods of shipment, the various opinions being based upon transit damage experience. When these experiences are checked it is generally found that the method of shipment is not so much to blame as the method of handling. The number of handlings between mill and press room is naturally a factor, and when this number is large, the greater protection to stock afforded by the roll handler is correspondingly more desirable.

The economic advantage of mechanical handling is as important to the publisher as it is to the paper manufacturer. There can be no standard measuring stick, because there are so many variables encountered from plant to plant, but it is very easy for power trucks to double the tonnage which a crew can handle in a given time, or to reduce the handling costs by 50 per cent. In one large plant, for example, four trucks dispose of 180 rolls per hour, working in conjunction with other material handling equipment in the plant. In a smaller plant a single truck has stored 110 tons in a day and also served the presses with from 10 to 30 tons.

Impressive economies have also been made in storage space. Where roll handling trucks are available it is common practice to set the rolls vertically on the floor of the storage room or warehouse, then high-tier more rolls horizontally on top of the vertical rolls. Horizontal tiering of 2,000 lb. rolls is wholly practicable up to 15 feet above floor level; consequently floor space is utilized to the limit. In one case where manual handling was the practice for many years the storage space held 210 tons and required 8 or 10 men to do the stacking. The introduction of mechanical stacking, with a roll handling truck made it possible to store 620 tons in the same space, and one man does the whole job, with complete safety for himself and for the paper stock.

Other types of power industrial trucks serve in a wide range of applications throughout the papermaking and printing industries. The present study has centered interest on the roll handling type because it has been designed to meet the special requirements of that service. It adds speed to the handling, it eliminates most of the personal hazard and the causes of damage and it increases the capacity of storage space. Introduction of this device made it practicable to produce newsprint in 60-inch rolls, with a reduction in delivered cost to the publisher. The latter benefits additionally by being able to buy paper in larger quantities, take delivery and store it without having to enlarge his storage space.



LEFT—The roll handler makes short, easy work of both loading and unloading. RIGHT—High-tiering of rolls is accomplished without injury to the stock.

PAPER SKETCHES

LOCAL SHOPS

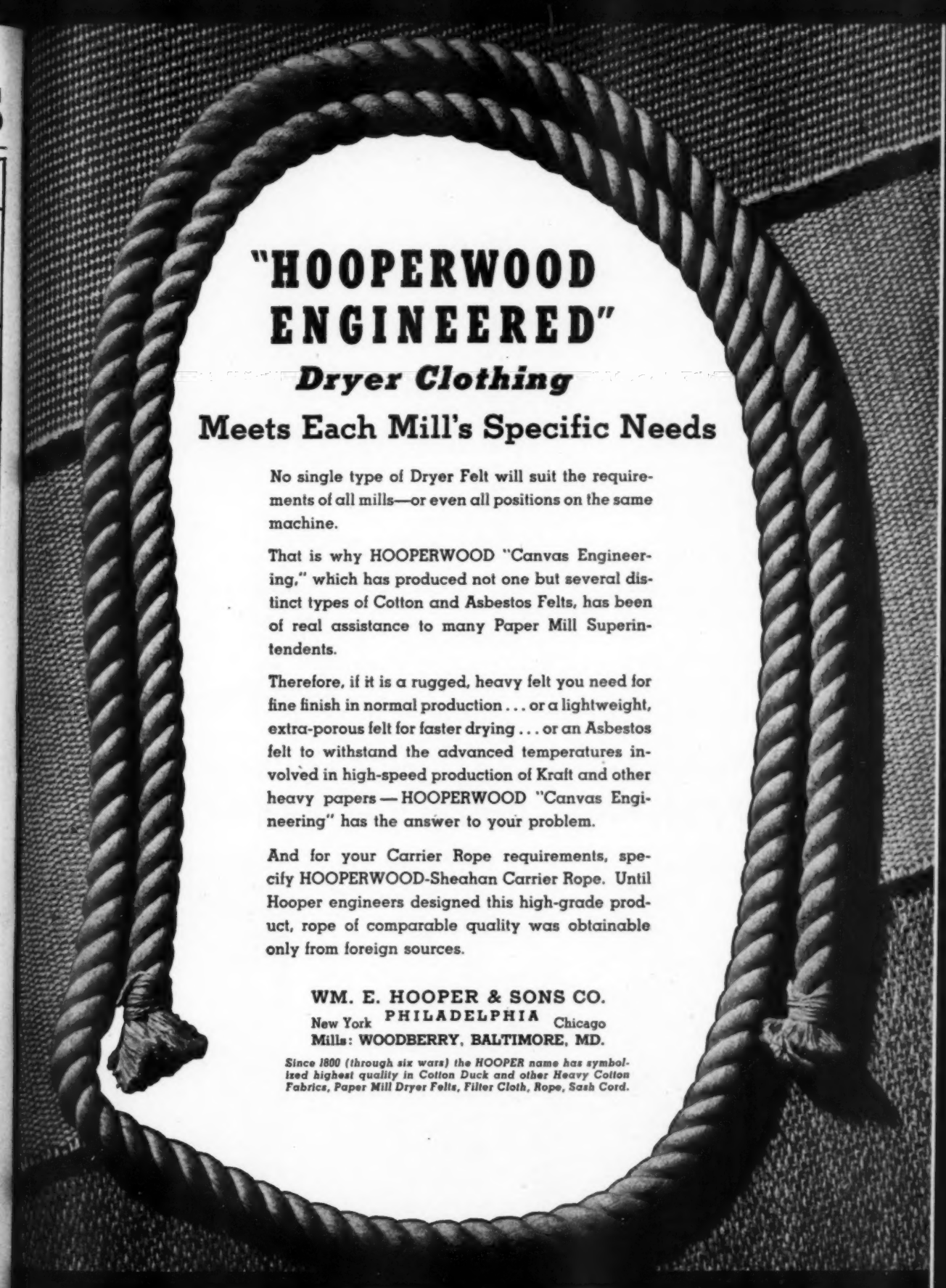
IN PALERMO, SICILY, FOLLOWING THE RECENT OCCUPATION OF THE ISLAND BY THE FORCES OF THE ALLIED NATIONS, WERE FOUND TO BE USING VALUABLE DOCUMENTS FROM THE ARCHIVES OF THE BOMB-RUINED NATIONAL LIBRARY LOCATED THERE, FOR WRAPPING PAPER. MOST OF THE MISSING DOCUMENTS WERE RECOVERED AND SAVED.

PAPER USED IN BOOKS

PRINTED DURING THE 1500'S SOMETIMES CONTAINS PARTICLES OF COPPER AND EVEN GOLD. THESE PARTICLES CAME FROM THE METAL THREADS IN BROCADES WHICH OFTEN WERE USED IN MAKING PAPER DURING THE PERIOD.

IN 1884, THE PRESIDENT OF THE EDISON COMPANY FOR ELECTRIC LIGHTING (NEW YORK) USED ELECTRIC LIGHTS COVERED WITH COLORED PAPER TO SIMULATE A FIRE IN HIS FIREPLACE.

THE WORLD'S LARGEST WOOD PULP MILL OF THE 1860'S WAS LOCATED AT MANAYUNK, PA. THIS MILL, WHICH PRODUCED 10 TO 12 TONS OF WOOD PULP DAILY, COST ABOUT HALF A MILLION DOLLARS TO BUILD.



"HOOPERWOOD ENGINEERED"

Dryer Clothing

Meets Each Mill's Specific Needs

No single type of Dryer Felt will suit the requirements of all mills—or even all positions on the same machine.

That is why HOOPERWOOD "Canvas Engineering," which has produced not one but several distinct types of Cotton and Asbestos Felts, has been of real assistance to many Paper Mill Superintendents.

Therefore, if it is a rugged, heavy felt you need for fine finish in normal production . . . or a lightweight, extra-porous felt for faster drying . . . or an Asbestos felt to withstand the advanced temperatures involved in high-speed production of Kraft and other heavy papers — HOOPERWOOD "Canvas Engineering" has the answer to your problem.

And for your Carrier Rope requirements, specify HOOPERWOOD-Sheahan Carrier Rope. Until Hooper engineers designed this high-grade product, rope of comparable quality was obtainable only from foreign sources.

WM. E. HOOPER & SONS CO.

New York **PHILADELPHIA** Chicago

Mills: WOODBERRY, BALTIMORE, MD.

Since 1800 (through six wars) the HOOPER name has symbolized highest quality in Cotton Duck and other Heavy Cotton Fabrics, Paper Mill Dryer Felts, Filter Cloth, Rope, Sash Cord.

HOOPERWOOD DRYER FELTS

COTTON AND ASBESTOS

ALLIED

DOW CORNING CORP. WILL MANUFACTURE SILICONE PRODUCTS

Representatives of Dow Corning Corporation (a subsidiary of Dow Chemical Company, Midland, Michigan) met with officials of the Westinghouse Electric and Manufacturing Company on July 12 at the Waldorf Astoria Hotel, New York City.

The meeting was held for the purpose of going over details of the new silicone products to be manufactured by the Dow Corning Corporation in a new plant at Midland, Michigan, and to review the history of the development of these products. The Westinghouse company has co-operated closely with Dow Corning in the testing of silicones, and some details of the tests conducted by that company were presented at the meeting. Sand, brine, coal, and oil are providing basic elements for opening a new field of chemical manufacture to produce silicones, materials of far-reaching industrial importance.

Among the executives attending the meeting were: Dr. Eugene C. Sullivan, president, Dow Corning Corporation, and director of research, Corning Glass Works; Dr. Willard H. Dow, president, The Dow Chemical Company; Glen W. Cole, president Corning Glass Works; M. W. Smith, vice president in charge of engineering, Westinghouse Electric and Manufacturing Company; and W. R. Collings, vice president and general manager, Dow Corning Corporation.

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SALES PROMOTION DEPT. ORGANIZED BY RELIANCE ELEC.

As a part of its preparations for postwar, The Reliance Electric & Engineering Company, Cleveland, has established a sales promotion department. On August 1, Roscoe H. Smith, who has been manager of applied engineering for the company, headed the new department, assisted by Kenneth F. Ertell, who has been named assistant advertising manager. Under the enlarged setup, C. V. Putnam, advertising manager, relinquishes his duties to Mr. Smith, but will continue his executive responsibilities as secretary of the company.

Roscoe H. Smith

Richard A. Geuder, who has been manager of metal industry applications, will succeed Mr. Smith as manager of applied engineering, without, however, abandoning altogether his specialization in motor drive problems of the metal industry. He will be assisted by John L. Van Nort, until

HOW AMERICAN INDUSTRY PRODUCES MORE, FASTER, BETTER—WITH BOWSER EXACT LIQUID CONTROL

Here's a Bowser Liquid Control Installation that PAYS 100% DIVIDENDS ANNUALLY

A nationally known plant in New York State installed a Bowser 2-meter Soluble Oil Proportioner (with piping and pumping equipment) for grinding and cutting solutions used in seven different departments. Previously the solutions were mixed in open drums and distributed manually.

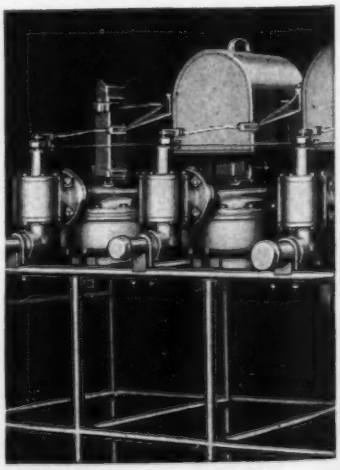
Results . . . 1. Three laborers, one for each shift, were released for other work. Estimated annual saving—$9,360.00. 2. Soluble oil consumption was reduced 10%. Estimated annual saving—$900.00. 3. Space for two storage drums was saved in each of seven departments. The proportioner and tanks in the oil house take only 30 square feet.

The first year's savings on labor and oil far more than paid for the entire installation. After that, it's "velvet."

That is only one phase of Bowser Exact Liquid Control, of course.

In the Paper Industry, for example, Bowser Lubrication Systems for dryers, calender stacks, Jordans, hydrafiners and turbines have been the almost universal choice for many years. Virtually all pulp and paper mills in the United States and Canada, as well as many in Europe, are Bowser-equipped. Also widely used are many smaller Bowser units, such as force-feed lubricators, oil filters for steam engines, flow indicating devices, etc.

A major reason for Bowser's dominance is that Bowser installations are engineered to meet the exact requirements of the mill. BOWSER, INC., Fort Wayne 5, Indiana.



BUY WAR BONDS

Not only has Bowser's war production earned the Army-Navy E... Bowser equipment has helped earn it for scores of other companies.

BOWSER ESTABLISHED 1885

The Name That Means Exact Control *of Liquids*

• *Built by Geo. W. Swift, Jr., Inc.*

"For fighting fronts!"

This Swift Combination Corrugating Machine has no bearing trouble as it handles paper for containers for the gifts and supplies from the folks at home to the boys on fighting fronts. That's because 58 SKF Bearings induce *continuous, smooth, swift running.* On the overhead bridge, in the single-facing machine and on the three-roll stands, SKF's guard shafts against Friction's costly drag, lower maintenance costs, and increase production. Heavy radial and thrust loads come and go, but SKF's take them easily. Shaft deflections, distortions or weave may occur, but SKF's compensate for them. As time goes on, SKF's show practically no wear . . . require only infrequent lubrication. A machine that has no bearing trouble has that much more time for production. 5618

SKF INDUSTRIES, INC., PHILADELPHIA 34, PA.

recently sales and application engineer for Reliance in Salt Lake City, and William C. Madsden, who has been on the company's application engineering staff for the past three years. Paul W. Arnold, manager of machinery design applications, continues in that capacity.

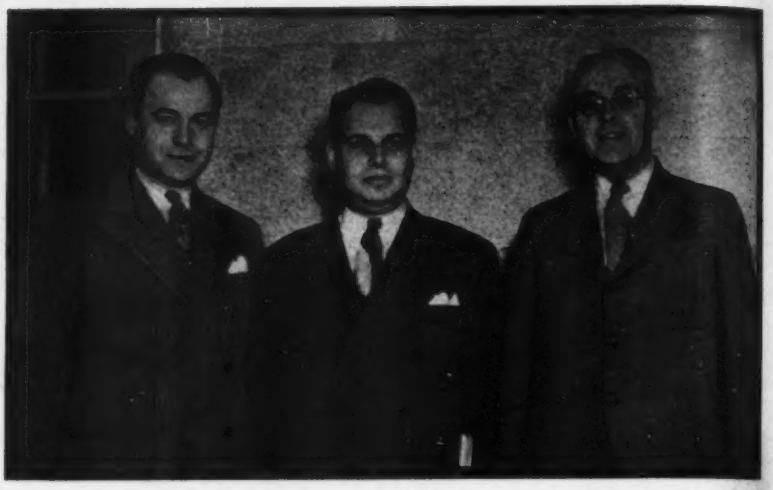
◆

WARWICK CHEMICAL CO. DEDICATES RICHMOND WORKS—ITS 4TH UNIT

Now ready for operation is the Warwick Chemical Company's new Richmond Works plant at Wood River Junction, Rhode Island, which was dedicated June 28. This is the fourth operating unit for Warwick Chemical Company, other plants being located at West Warwick, Rhode Island, Rock Hill, South Carolina, and Chanute, Kansas. Sales offices and laboratory are located in New York City.

The Richmond Works was so named in honor of Frank Richmond, chairman of the board of Warwick Chemical Company, and chairman of the board of the Crompton Company.

The dedication concluded the annual three-day meetings of all Warwick sales and executive personnel which was held in West Warwick and Providence, Rhode Island. Guest speaker and honored guest at the dedication was His Excellency J. Howard McGrath, Governor of the State of Rhode Island. Frank Richmond, chairman of the board, and Ernest Nathan, president of Warwick Chemical Company, also spoke at the ceremonies.



Governor J. Howard McGrath (left) of Rhode Island helps dedicate the new Richmond Works of Warwick Chemical Company in Wood River Junction, Rhode Island. With the Governor are Ernest Nathan (center), president and Frank Richmond, chairman of Warwick Chemical Company. The plant is named in honor of Mr. Richmond.

▸▸▸ The 1944-45 EDITION OF *Barrell's Paper Annual*, recently published, contains several special features. The leading feature of this publication is "Postwar Possibilities of the Paper Industry," written by R. G. Macdonald, secretary-treasurer of the Technical Association of the Pulp and Paper Industry. Following this, are

TO MAKE KNIVES LAST LONGER

3 SIMPLE RULES

TO ELIMINATE KNIFE TROUBLES

The right knife grinder is important, too! Covel-Hanchett engineers will advise you as to the proper style and size of machine to answer your needs. There is a Covel-Hanchett for every requirement — write for complete Catalog.

SEND FOR THIS CATALOG TODAY

★ ★ ★

RULE 1—Putting the Knife on the Wheel

YOUR KNIVES are made with a strip of high-grade tool steel, or Genuine High-Speed Steel, welded on a soft steel backing. It is this tool steel, or High-Speed Steel that makes the cutting edge, and it is ONLY this finer steel that is apt to overheat to a burning point. No care is needed to protect the backing. The care must be all concentrated on the cutting edge.

Fig. A. Proper Grinding on Periphery of Solid Wheel

Illustrations "A" and "B" show the proper way to put your knife in contact with the emery wheel. Note the tool (or High Speed) steel cutting edge is up where it contacts the wheel first and where the coolant directly contacts the cutting edge, eliminating the main cause of overheating. Also, in this position the debris from the cutting is carried past the soft steel backing where it can do no harm.

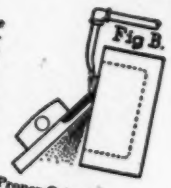


Fig B. Proper Grinding on the Side of Cup Wheel

RULE 2 Use Plenty of Good Coolant Applied at Proper Points

PLENTY of good coolant, in fact you cannot use too much. It is very easy to use too little. Therefore, be on the safe side by using PLENTY. Plenty of coolant directly on the tool (or High Speed) steel cutting edge means that you simply cannot burn it. Grinding burns cause cracks that break out. Plenty of coolant AT THE RIGHT POINT stops burns. Have the coolant running on the wheel before you start to grind.

RULE 3 Use a Medium Soft Wheel for Free Cutting

WE ADVOCATE a soft grinding wheel with medium grit. These wheels will wear away a bit faster than harder wheels. In fact, a wheel that does not wear away is not cutting well. The increased life of the properly ground knife many times offsets the slightly increased cost of wheel wear. See that the bearings are tight when you use a soft wheel. Dress your wheel often and prevent glazing that leads to overheating.

★ SAW SHARPENERS
★ SAW STRETCHERS
★ KNIFE GRINDERS
★ SWAGES AND SHAPERS
★ WELDING CLAMPS

COVEL-HANCHETT CO.
BIG RAPIDS, MICHIGAN PORTLAND, OREGON

★ ELECTRIC BRAZERS
★ ANVILS AND HAMMERS
★ BAND WHEEL GRINDERS
★ MISCELLANEOUS SAW & KNIFE FITTING EQUIPMENT

LOWER MAINTENANCE COST

..with WELDCO Covered Rolls

New or old rolls, covered by the special Weldco Pressure Welding Process,* have long ago established remarkable records for long service with a minimum of maintenance cost. They provide:

—longer life because of increased corrosion resistance

—better wearing qualities due to superior abrasion resistance of the cover material

—decreased maintenance cost by decreasing the frequency of regrinding and polishing.

* *A Patented Process*

Remember Please . . . .

Weldco covers of Monel, Inconel, nickel, stainless steel or any weldable material may be applied to your new or old rolls. Ask your machinery manufacturer about Weldco Rolls.

WELDCO

THE YOUNGSTOWN WELDING & ENGINEERING CO.

3752 OAKWOOD AVE. YOUNGSTOWN, O.

illustrations of some of the exhibits at the Army-Navy Conference sponsored by TAPPI in Chicago last September. Commemorating the silver anniversary of the American Pulp and Paper Mill Superintendents Association is a special article "Twenty-five Years of Activity in the Superintendents Association," by George Craigie, national secretary-treasurer of the Superintendents Association. The book is well illustrated, with stiff cover, spiral bound.

◆

ARMY-NAVY "E" AWARDS

First Star: Cochrane Corporation, Philadelphia, Pennsylvania.

Second Star: Container Corporation of America, Philadelphia, Pa.; The Foxboro Company, Foxboro, Mass.

Fourth Star: De Laval Steam Turbine Company, Trenton, N. J.

NEW HARRIS-SEYBOLD-POTTER CALENDAR FOR THE NEXT 12 MONTHS

The Harris Calendar for 1944-45, the fifth in a series of lithographed calendars, featuring subjects of T. M. Cleland, is now being distributed. The practical feature of this fine calendar is that it gives a full year from July 1, 1944, which, of course, carries its value into next year. The fine artistry which enhances this calendar greatly beautifies a subject that is often colorless and drab.

The calendar this year portrays the romantic form and treatment of an imaginary 18th century scene of winter life, which might have been in northern France. The company will send copies as long as the supply lasts.

◆

▶▶▶ PRODUCTS FOR the paper trade made by the newly formed Pigment Department, Calco Chemical Division, American Cyanamid Company (Cf. P. I. & P. W. July, 1944, p. 472) will be sold by the Heller & Merz Department. This organization is headed by J. H. Loomis, sales manager. Mr. Loomis states that in this new setup, Unitane (titanium dioxide) and other products of the Virginia Chemical Corporation, whose manufacturing facilities have just been acquired by Calco, will be sold by the Heller & Merz Department.

◆

▶▶▶ EXCLUSIVE REPRESENTATION for the Whiting Corporation, Harvey, Illinois, in the Omaha territory has been given to the Cardinal Supply & Manufacturing Company, Omaha, Nebraska. This territory includes Nebraska and western Iowa.

SAFETY CONTEST SCORES

The annual contest among mills in the Paper and Pulp Section of the National Safety Council closed June 30.

Due to the fact that all reports must be in before final scores can be published, additional time is needed to figure scores following the close of the contest. Therefore, the final scores, as of June 30, were not ready when this issue went to press.

Watch this section for closing figures on the contest.

"Supervised for Your Satisfaction"

this FITCHBURG "TRIUNE" Cotton Dryer Felt

is doing a great job of drying paper

Made of the finest cotton, carefully checked all through the spinning, twisting, weaving and final inspection

5 distinct weaves — For every paper
Prestretched and preshrunk if you desire

General Sales Agents

Morey Paper Mill Supply Co., 309 South St., Fitchburg, Mass.

SPEEDS UP HANDLING OF MATERIALS

Automatic
TRADE MARK
TRANSPORTER

- Positive mechanical brake
- Controls in steering handle
- Forward and reverse speeds
- Front wheel power drive
- Shockless hydraulic lift with easy foot control
- "Dead-Man" Control

No Straining-No Tugging
No Pulling - No Pushing

• As soon as a TRANSPORTER goes to work for you the problem of transporting tons of material is simplified. You at once add speed to the transportation of material — your workers do much bigger handling jobs without fatigue, you cut handling costs considerably, and you increase safety to employees.

It doesn't take an experienced man or woman to operate a battery-powered TRANSPORTER — it doesn't require muscle. The trucker walking along with the load guides the TRANSPORTER. Forward or reverse movement — complete brake and speed control.

Write for complete details.

MANUFACTURERS FOR OVER THIRTY FIVE YEARS *Electric Propelled* INDUSTRIAL TRUCKS

AUTOMATIC TRANSPORTATION CO.

113 WEST 87th STREET — DIV. OF THE YALE & TOWNE MFG. CO. — CHICAGO 20, ILLINOIS

ASSOCIATIONS

TAPPI FALL MEETING HAS BEEN CANCELLED

In co-operation with request from the Office of Defense Transportation that meetings of large groups be cancelled, the membership of the Technical Association of the Pulp and Paper Industry recently voted, almost unanimously, to cancel plans for a fall convention this year. A similar cancellation was effected during World War I.

The various sections of the Association will hold fall meetings and many of the committees will hold meetings to plan work for the coming year, particularly for the annual meeting to be held in February, 1945.

◆

AMER. PULPWOOD ASS'N ENGAGES TROWBRIDGE AS LOGGING ENGINEER

Announcement from the American Pulpwood Association states that K. S. Trowbridge has been engaged as a member of its staff. Mr. Trowbridge has been connected with the Brunswick Pulp and Paper Company, Brunswick, Georgia, and recently has served with the War Production Board as a Pulpwood Production Consultant.

Mr. Trowbridge will act as logging engineer, and will, for the present, devote his time to a program recently initiated by the Association of improved logging technique through the mechanization of woods operations.

The purpose of the contemplated study by the American Pulpwood Association is to make known to all industry members the type, operation, and availability of equipment which will give maximum production with minimum labor requirements, and results will be made available to all interested industry members.

◆

▶▶▶ CANCELLATION OF the fall convention of the National Paper Trade Association has been announced. The meeting was called off due to request of the ODT that all non-war connected conventions and meetings be given up to lighten the burden on the country's transportation facilities.

◆

CONVENTIONS AND COMING EVENTS

September 1, 2—Joint meeting of Northeastern Division of The American Pulp and Paper Mill Superintendents Association and the New York Section of TAPPI, Welland House, St. Catherines, Ontario.

September 14-16—Fall meeting of the Northeastern Division of the American Pulp and Paper Mill Superintendents Association at Poland Springs House, Poland Springs, Maine.

October 3-5—33rd National Safety Congress and Exposition at the Sherman, Morrison and La Salle Hotels, Chicago.

October 27-28—Annual meeting of the Southeastern Division of the American Pulp and Paper Mill Superintendents Association at the Grove Park Inn, Asheville, North Carolina.

November 15-19—National Chemical Exposition at the Coliseum, Chicago.

STATED MEETINGS

Technical Associations of the Pulp and Paper Industry.

Delaware Valley Section—First Friday of each month at the Engineers' Club, Philadelphia, Pa.

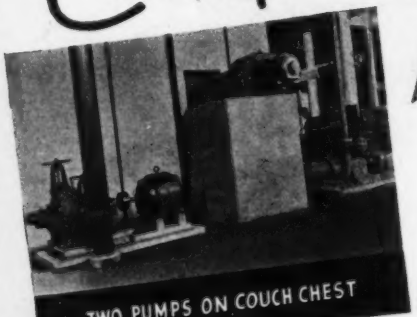
Kalamazoo Valley Section—First Thursday of each month, including June, at 6:30 P. M. at the Columbia Hotel, Kalamazoo, Mich.

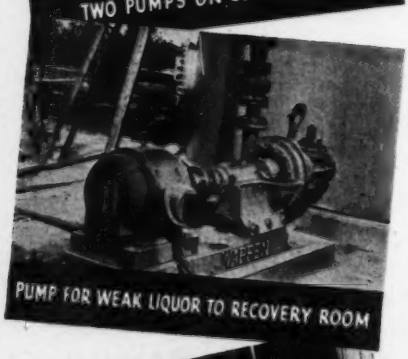
Lake States Section—Second Tuesday of each month at the Conway Hotel, Appleton, Wis.

Chicago Professional Paper Group

First Monday of each month except July and August, at Chicago.

Check with Warren for SUCH SERVICES AS:





Black Liquor
Bleached Liquor
White Water
Showers
Boiler Feed
Green Liquor
Stock — thick and thin
Wash water — hot and cold
Caustic
Underwater Fire

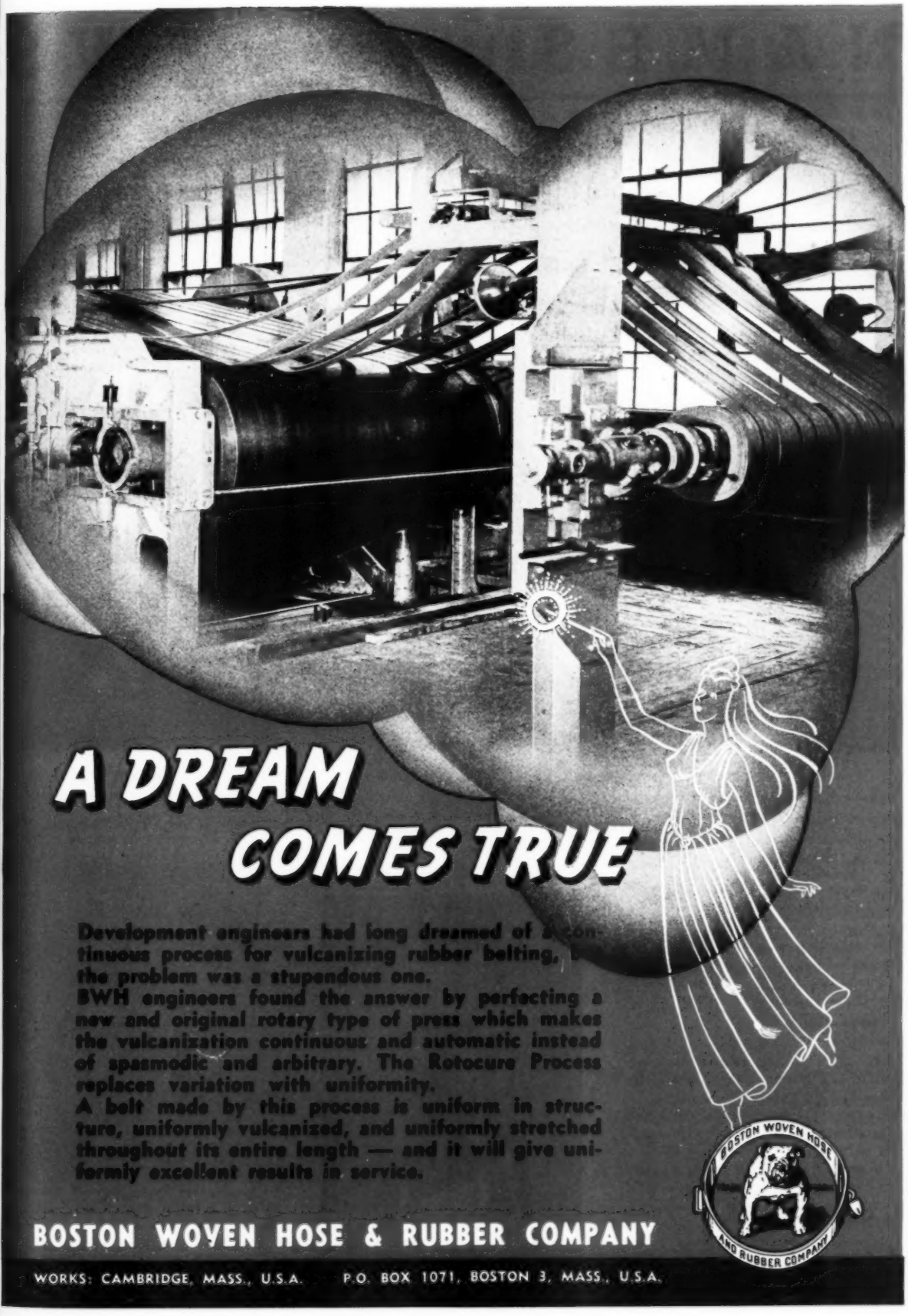
Why Warren? Because Warren Paper Mill Pumps not only stay with their jobs and protect against costly service interruptions, but they handle their jobs, year after year, at consistently low operating and maintenance costs.

FOR ALL PAPER MILL REQUIREMENTS, SPECIFY:

WARREN PUMPS

ARMY E NAVY

WARREN STEAM PUMP COMPANY, INC.
WARREN, MASSACHUSETTS


A DREAM
COMES TRUE
Development engineers had long dreamed of a continuous process for vulcanizing rubber belting, but the problem was a stupendous one.
BWH engineers found the answer by perfecting a new and original rotary type of press which makes the vulcanization continuous and automatic instead of spasmodic and arbitrary. The Rotocure Process replaces variation with uniformity.
A belt made by this process is uniform in structure, uniformly vulcanized, and uniformly stretched throughout its entire length — and it will give uniformly excellent results in service.
BOSTON WOVEN HOSE & RUBBER COMPANY
WORKS: CAMBRIDGE, MASS., U.S.A.
P.O. BOX 1071, BOSTON 3, MASS., U.S.A.
BOSTON WOVEN HOSE AND RUBBER COMPANY

NAMES *in the* NEWS

Personals

WESTINGHOUSE GIVES COOPER PROMOTION

The appointment of A. Morton Cooper as manager of the general mill section of the industrial department of Westinghouse Electric & Manufacturing Company has been announced.

A. Morton Cooper

Mr. Cooper started with the company in 1920 as a clerk. In 1929 he was appointed salesman in the Philadelphia office handling paper and rubber industries. In 1942, he was transferred to the general mills section at East Pittsburgh handling paper, textiles, rubber, and several other lines. He is a charter member of the Delaware Valley section of TAPPI, and is an active affiliate of the American Pulp and Paper Mill Superintendents Association.

◆

▶▶▶ After serving as assistant treasurer of the Millers Falls Paper Company, Millers Falls, Massachusetts, for forty years, *J. Edwin Randall,* Holyoke, Massachusetts, has retired. He also has retired from the position of clerk of the corporation. Mr. Randall joined the company in 1904, two years after its organization. Harold H. Affhauser, of Greenfield, Massachusetts, has been appointed assistant treasurer, and R. Farley Chapin, of Greenfield, a vice president of the company, has become clerk of the corporation.

▶▶▶ The University of New Brunswick has conferred upon *John F. Walker,* research associate at the Pulp and Paper Research Institute of Canada, the degree of Master of Science in Forestry. For the past four years Mr. Walker has been conducting research work under the direction of A. Koroloff, manager of the Woodlands Section of the Canadian Pulp and Paper Association. He spent three years with the Forest Products Laboratories in Ottawa and four years with Price Bros. and Company.

◆

▶▶▶ After having been connected with the firm's engineering staff for some 24 years, *Frederick W. Mesinger* has been made a vice president of Norma-Hoffmann Bearings Corporation, Stamford, Connecticut. For the past 16 years Mr. Mesinger has been district manager of the New York office of the company.

◆

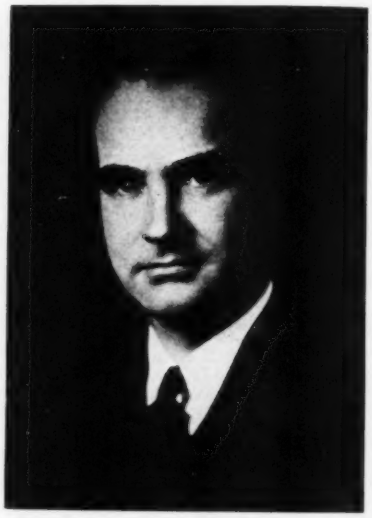
E. C. ATKINS AND CO. ELECTS NEW PRESIDENT

As president of E. C. Atkins and Company, Indianapolis, Elias C. Atkins, first vice president, succeeds his father, the late Henry C. Atkins. Another son of the late president, Keyes W. Atkins, who has been vice president and general sales manager, has been elected as first vice president in charge of sales.

Elias C. Atkins first entered the employment of the company in 1915, working in many of the factory departments to learn the intricacies of manufacture employed in the company's products. He became vice president in 1924, advanced to superintendent in 1931 and became first vice president in 1936. He attended Taft School and Yale University. He also served in World War I.

Elias C. Atkins

Keyes W. Atkins entered the company employment in 1917 working through various jobs in the plant. He served as sales manager of the crosscut saw division, and was elected vice president in 1924. From 1926 to 1929 he was manager of the Memphis (Tenn.) branch. Thereafter he was manager of the mill and industrial sales division at Indianapolis. In 1936 he was made vice president and general sales manager, covering all sales, both domestic and foreign. He attended Taft School and Sheffield Scientific School of Yale University. He also served in World War I.



Keyes W. Atkins

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▶▶▶ A recent announcement from Norma-Hoffmann Bearings Corporation, Stamford, Connecticut, states that *D. E. Batesole* has been made vice president and chief engineer. He has been a member of the firm's engineering department for over 25 years and has been chief engineer since 1937.

◆

▶▶▶ A new post, that of assistant director general of the Chemicals and Explosives Production Branch of the Department of Munitions and Supply, Ottawa, Canada, has been filled by the appointment of *Dr. J. H. Ross,* M.B.E. For some years, Dr. Ross was director

SODIUM ALUMINATE

Again available to help you get better sizing at high pH . . . better machine conditions

Monsanto now offers two grades of Sodium Aluminate:

1. Sodium Aluminate White Soluble — a product of exceptional quality which will meet your most exacting requirements.
2. Sodium Aluminate BC — a product containing a small quantity of sodium chromate but for many purposes an efficient replacement for our white soluble grade.

If you learned through experience before the war how effectively Monsanto Sodium Aluminate helps control acidity, without sacrificing sizing, you will recognize this at once as good news.

If you are not familiar with the improvements in finished paper and machine conditions which this alkaline source of alumina makes possible, the two curves below will illustrate more graphically than several hundred words *why* and *how* the availability of an alternate Sodium Aluminate is important.

The lower curve shows what happens to sizing when you try to reduce acidity by simply using less alum. The upper curve shows how a good degree of sizing can be maintained even at a high pH when you replace part of your alum with Sodium Aluminate.

By thus using the two sources of alumina in varying proportions, you can obtain any amount of alumina under any pH conditions. This means:

better sizing at high pH;

less corrosion and therefore longer life for wires;

lower sulfate content in white water and in the paper;

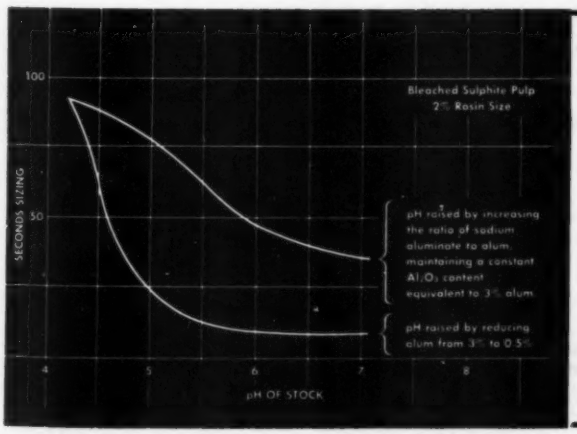
less acid white water, more suitable for re-use;

less acid and therefore more permanent paper;

increased color retention in paper.

Monsanto Sodium Aluminate White Soluble and Sodium Aluminate BC are both readily soluble in water and are low in insolubles and iron. Either grade remains stable in 6% water solutions for several weeks, which means that either can be mixed at any point in the mill and piped to any point in the system *without* danger of forming aluminum oxide to clog pipes. Compared with other alkalis sometimes used with alum for pH control, Sodium Aluminate is usually lower in first cost and invariably produces greater benefits. Although Monsanto Sodium Aluminate BC contains a small quantity of sodium chromate, it can be safely handled with a few simple precautions.

For full details and experienced technical help in capitalizing the advantages of Sodium Aluminate BC in *your* production, write: MONSANTO CHEMICAL COMPANY, Merrimac Division, Everett Station, Boston 49, Mass.



TYPICAL ANALYSIS

	White, Soluble Sodium Aluminate	Sodium Aluminate BC
Sodium Aluminate ($Na_2Al_2O_4$)	90.0%	80.0%
Alumina (Al_2O_3)	56.0%	50.0%
Iron (Fe)	0.01%	0.07%
Insoluble	0.05%	0.8%
Sodium Chromate (Na_2CrO_4)	——	Less than 3.0%

MONSANTO CHEMICALS
SERVING INDUSTRY...WHICH SERVES MANKIND

of the Pulp and Paper Division of the Forest Products Laboratories of Canada, at Montreal. Since January, 1940, he has been associated with the Chemicals and Explosives Branch of the Munitions Department, where he was director of research and development until his recent appointment.

◆

▶▶▶ Personnel changes in the Virginia Cellulose Department, Hercules Powder Company, were announced June 22, effective on that date. *Elmer F. Hinner* becomes assistant general manager, and *Charles H. Lickle* was appointed manager of cellulose purchases.

◆

▶▶▶ A new appointment has been given *D. G. Stenstrom,* who has served as deputy technical adviser of the pulp and paper administration in Canada since last December. He has just been made deputy administrator of newsprint by the Wartime Prices and Trade Board. The administrator is Guy E. Hoult. Mr. Stenstrom has had extensive experience in problems of the paper industry, having worked with the St. Lawrence Paper Mills, then in Australia, and later as a private consultant.

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▶▶▶ In addition to his present duties, *Jay E. Miller,* has been named advertising manager of industrial products and sundries division of the B. F. Goodrich Company. He had previously been sales promotion manager, which duties he will retain. Mr. Miller has been with the company since 1936.

◆

▶▶▶ A new member of the engineering department of P. H. Glatfelter Company, Spring Grove, Pennsylvania, is *George N. Miller,* former engineer of the Riverside and Dan River Cotton Mills, Danville, Virginia. He will be in charge of power and steam. This position was formerly held by *E. F. Troop,* who has now become personnel manager of the Glatfelter Company.

◆

▶▶▶ The Controllers Institute of America has admitted to membership *Norman B. Whittier,* comptroller of the Eastern Corporation, Bangor, Maine.

◆

▶▶▶ The resignation of *E. L. Hobaugh* as superintendent of the paper mill of the Union Bag & Paper Corporation, Savannah, Georgia, took effect July 12. *Raymond Almand* is now acting superintendent.

▶▶▶ Announced last month and now effective is the appointment of *Paul E. Klopsteg* as director of research and professor of applied science in the new Technological Institute of Northwestern University, Evanston, Illinois. Dr. Klopsteg was formerly president of the Central Scientific Company, Chicago. In his new duties he will undertake the development of advanced studies and the co-ordination of research for the postwar period.

◆

ELECTRIC MACH'Y MFG. ELECTS R. H. OLSON AS VICE PRESIDENT

An announcement from the Electric Machinery Manufacturing Company, Minneapolis, states that R. H. Olson, who has been manager of the New York district office of the company, has been appointed to the position of vice president in charge of sales, with headquarters at the company's home office in Minneapolis.

R. H. Olson

Mr. Olson began his work with the company in 1919 after graduation from the University of Minnesota. A. P. Burris will succeed Mr. Olson as manager of the New York district office.

◆

▶▶▶ A new office has been added to the duties of *C. P. Cowan,* vice president of Building Products, Ltd., Montreal, Canada. He also has been appointed general manager of the company.

◆

▶▶▶ Formerly assistant to the general sales manager of the Airtemp Division of the Chrysler Corporation, Dayton, Ohio, *Harry W. Gray* is now associated with Manning, Maxwell & Moore, Inc., Bridgeport, Connecticut. Mr. Gray has had a wide background of product development and market research. Under the direction of C. H. Butterfield, vice president in charge of sales, he will devote his time to an analysis to determine how the company's products can best contribute to the advancement of present day industry.

◆

▶▶▶ On August 1, *Walter P. Konrad,* formerly of the sales department of Monsanto Chemical Company, St. Louis, Missouri, took over new duties as branch manager of the Phosphate division sales department in Chicago.

◆

▶▶▶ The appointment of *Roland J. Schmitt* as manager of its Pacific Northwest Division has been announced by E. C. Atkins and Company, Indianapolis, Indiana. Mr. Schmitt will succeed H. G. Mackenzie, who is leaving the company. *A. Stanley Caster* is being promoted to office manager of the company's Portland (Oregon) office. Headquarters of both men will be at the company branch factory in Portland.

◆

▶▶▶ The appointment of *Edgar A. Rogers* as exclusive representative in Georgia, Alabama, and the major portion of Tennessee has been announced by Mixing Equipment, of Rochester, New York.

◆

▶▶▶ To fill the newly created position of sales manager, the appointment of *Albert W. Coleman* has been announced by Manning, Maxwell & Moore, Inc., Bridgeport, Connecticut. The newly created position was made to meet the accumulated changed conditions and postwar plans for the manufacture of the company's products. Mr. Coleman has been with M. M. & M. for the past 23 years. He will make his headquarters at Bridgeport.

◆

▶▶▶ The Distinguished Flying Cross and the Air Medal with three Oak Leaf Clusters has been conferred upon *Lt. George C. Arnold,* who before enlisting in the Army was on the staff of the Bulkley, Dunton Pulp Company.

◆

▶▶▶ As director of public relations, the Pittsburgh Plate Glass Company has appointed *Guy Berghoff. Bryan England* has been made assistant director. For the past ten years, Mr. Berghoff has been assistant glass

GREATLY REDUCES *Bearing Wear and Replacements* . . . yet it is as SIMPLE as ABC . . .

NO OBLIQUE RESULTANT
ALL RADIAL loads carried at RIGHT ANGLES to the roller axis
ALL THRUST loads carried at RIGHT ANGLES to the roller axis

A all radial loads carried at right angles to the roller axis

B all thrust loads carried at right angles to the roller axis

C no oblique components to complicate radial and thrust pressures.

with

ROLLWAY RIGHT-ANGLED LOADING

Costs pared to the bone! That will be the production slogan after the war. And right now — with new designs on your boards — is the time to think about new, longer-wearing or higher-capacity bearings . . . both for your production machinery, and for the products you make. Find out how Rollway's Right-Angled Bearing Loading will simplify the loads. How it will permit smaller housings, heavier pressures, or longer bearing life — even proportionate combinations of all three.

For compound loads, SEPARATE radial and thrust bearings are used in combination as per diagram.

Rollway Splits the Load, Reduces the Pressures

Because Rollway Roller Bearings are always loaded at right angles to the roller axis, only one load component—either pure radial or pure thrust—can bear upon the rollers. That means reduced load pressures within easily computed limits, greater resistance to shock, oscillating or vibrating loads, and to overloads. No oblique components can raise the stresses above the elastic limits. You know the simple forces you are dealing with, and you can provide for them adequately.

SAE and American Standard Metric Sizes

Rollway has developed many variations of its solid cylindrical roller bearings in SAE and American Standard metric sizes, each having definite characteristics to meet exacting needs.

Let us help you to take full advantage of this wide choice of types and sizes. Just send us your design, or a detailed description for free, confidential analysis. No obligation.

ROLLWAY BEARING COMPANY, INC., SYRACUSE, NEW YORK

BUILDING HEAVY-DUTY BEARINGS SINCE 1908 — **BEARINGS**

advertising manager. More recently, much of his time has been given to glass sales promotional work and to glass-product publicity. Mr. England, who has directed the company magazines, will continue to edit these publications, and will assist in publicity work.

◆

▶▶▶ The office of director of purchases of United States Rubber Company, New York City, has been filled by the appointment of *Stanley W. MacKenzie,* who has served as assistant to the director of purchases since 1941. He succeeds *George M. Tisdale,* recently elected a vice president and member of the executive committee of the company.

◆

▶▶▶ A new manager has been appointed for its Chicago office by the Boston Woven Hose & Rubber Company, Boston, Massachusetts. *John H. Rowe,* who for several years has been Chicago manager, has been made vice president in charge of western sales, covering the territory from Chicago to the Pacific Coast. On August 1, *Stuart A. Guild,* who has been in charge of the Connecticut, Rhode Island and western Massachusetts territory, will become manager of the Chicago office.

CHAS. L. SAUNDERS BECOMES VICE PRES. WHEELCO INSTR. CO.

Former vice president of Minneapolis-Honeywell Regulator Company, Minneapolis, Charles L. Saunders, has resigned as branch chief of the WPB Office of Civilian Requirements to become vice president of Wheelco Instruments Company, Chicago. Mr. Saunders joined the WPB in March, 1942, to organize an instrument branch to correlate manufacturing problems of the instrument industry with war production. He is a graduate electrical engineer of the University of Virginia, and previously served as sales correspondent and district manager of Brown Instrument Company. When Minneapolis-Honeywell acquired the Brown company in 1935, Mr. Saunders was appointed Chicago regional sales manager and two years later became resident vice president of the company.

Chas. L. Saunders

The head office of Wheelco Instruments Company is in Chicago. There are branch offices in 25 U. S. cities and 8 foreign countries.

◆

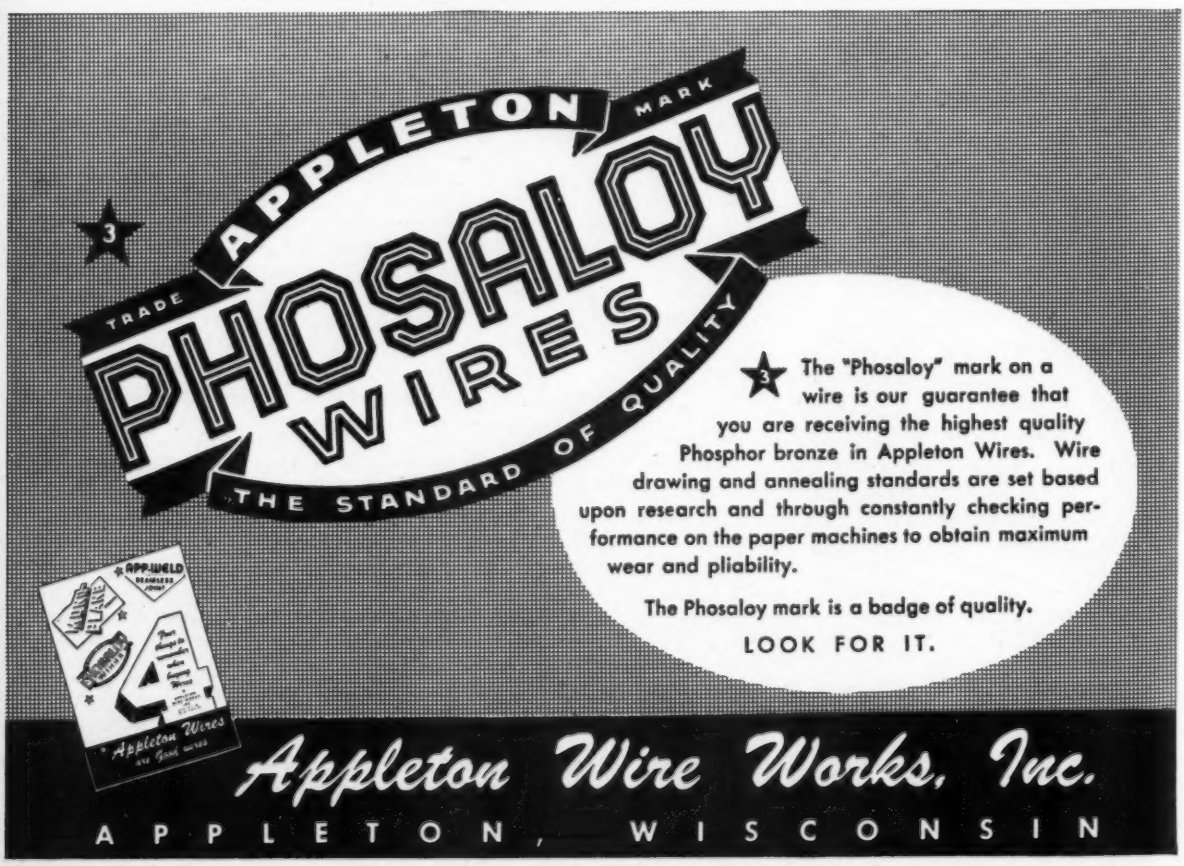
▶▶▶ New manager of the Southern Division of National Starch Products, Inc., New York City, is *Mack E. Kittay.* Prior to his enlistment in the Army, Mr. Kittay was for 13 years with National Adhesives Corporation (now a division of National Starch Products) serving customers in the New York area. He will co-ordinate company activity in the Southern territory with headquarters in Houston, Texas.

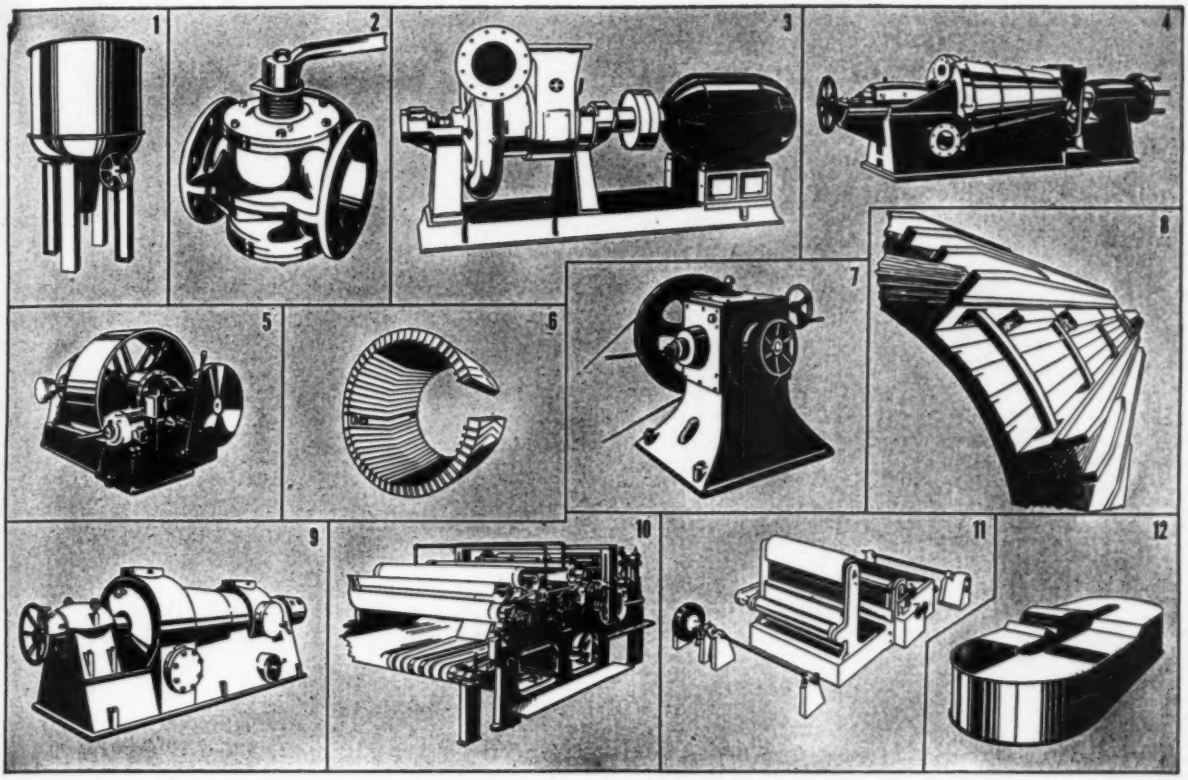
◆

▶▶▶ Appointed works manager of the Sorg Pulp Company, Port Mellon, British Columbia, *C. M. Belden* succeeds the late Herve D. Humphreys, who held the office but a few months. Mr. Belden formerly was with Pacific Mills, Ocean Falls, British Columbia, also with the Abitibi Power and Paper Company, Espanola, Ontario, and Donahue Brothers at Murray Bay, Quebec.

◆

▶▶▶ Formerly superintendent of Minas Basin Pulp and Paper Company, Hantsport, Nova Scotia, *C. B. McKenna* is now at Nipigon, Ontario.


APPLETON
MARK
TRADE
PHOSALOY
WIRES
THE STANDARD OF QUALITY
The "Phosaloy" mark on a wire is our guarantee that you are receiving the highest quality Phosphor bronze in Appleton Wires. Wire drawing and annealing standards are set based upon research and through constantly checking performance on the paper machines to obtain maximum wear and pliability.
The Phosaloy mark is a badge of quality.
LOOK FOR IT.
Appleton Wire Works, Inc.
APPLETON, WISCONSIN



1. **BABY HYDRAPULPER**—For small commercial runs, experimental laboratories and molded products . . . 4 foot diameter . . . capacity to 10 tons.

2. **HOPE TYPE ROTARY VALVE**—Non-corrosive lining . . . free operation even after long shut-down. 2-way . . . 3-way . . . 4-way. Remote control. Pressure seal. Try one.

3. **D-S CENTRIFUGAL PUMP**—Versatile adaptation to mill layouts. Rigid shaft. The most for your pump dollar.

4. **MIAMI No. 2-A JORDAN**—Most modern jordan available today. Heavy shell one piece construction . . . quickly demountable. 10 other sizes to choose from.

5. **CALENDER REVERSING DRIVE**—Ejects plugs from calender stack instantly without danger to employees. Saves broke . . . saves time . . . saves lives.

6. **BULLDOG JORDAN FILLING** — The first preassembled and most widely used of all fillings. Ready to prove its worth by trial.

7. **FOURDRINIER SHAKES**—Several outstanding features not found elsewhere . . . cannot work loose and change adjustment.

8. **X-66 JORDAN PLUG**—Over a period of 8 years not a lug broken . . . have not had a complaint . . . has consistently proved its superior features. Over 300 in use.

9. **HYDRAFINER**—The culmination of long experience on stock preparation problems. Get "Messenger No. 205" for the whole story.

10. **BLACK-CLAWSON CUTTER**—Rugged, heavy duty. Duplex . . . Triplex Money-savers on board machines, due to close tolerances obtainable.

11. **MIAMI WAX MACHINE**—Brings several advantages to the wax industry that makes it a real worthwhile investment. Several on order for post-war delivery.

12. **BREAKER BEATER** — Although hard pressed by hydrapulper, it has certain fields of application. Before deciding compare the hydrapulper and breaker in view of your problem. See "Messenger No. 202."

THE BLACK-CLAWSON CO., HAMILTON, OHIO

DIV. SHARTLE BROS. MACHINE CO., MIDDLETOWN, OHIO

DIV. DILTS MACHINE WORKS, FULTON, NEW YORK

KAYDON ENGINEERING CORP. MAKES TWO PERSONNEL ADDITIONS

Two important personnel additions have been announced by the Kaydon Engineering Corporation, Muskegon, Michigan.

J. F. Oehlhoffen, formerly sales manager and advertising director for the Bantam Bearing Division of the Torrington Company, South Bend, Indiana, has joined the Kaydon organization as assistant to the president, A. H. Frauenthal.

H. J. Miller, formerly plant manager of the Goodyear Aircraft Corporation, Newark, Ohio, division, has become factory manager for Kaydon Corporation at Muskegon.

◆

▶▶▶ The appointment of *G. F. Golby* as manager of its Toronto, Canada, branch office and warehouse is announced by Jessop Steel Company, Washington, Pennsylvania. Another appointment by Jessop is *W. J. Henderson,* who has been named manager of the Montreal warehouse.

◆

▶▶▶ Arkansas State Forester, Fred H. Long, has announced the appointment of *Arthur M. Emmerling* as consultant of the Gulf-Western region, which includes Arkansas, for the forest resource appraisal program. A forestry survey of the state is planned for estimating both wartime drain on forest reserves and postwar needs in the field.

◆

▶▶▶ The Houston Control of the Controllers Institute of America has re-elected *C. B. Edwards* as vice president. Mr. Edwards is controller of the Southland Paper Mills, Inc., Lufkin, Texas.

◆

NAT. ACADEMY OF SCIENCES ADMITS DR. EDW. CONDON

The National Academy of Sciences has elected to membership in that body, Dr. Edward U. Condon, associate director of the Research Laboratories for the Westinghouse Electric and Manufacturing Company.

The total membership of the Academy now is only 352. This organization was incorporated by Congress to report on matters in science or art whenever called upon, and often has been of service to the Government of the United States. Membership in this body is based upon outstanding contribution to the field of science.

Dr. Condon is a graduate of the University of California, from which institution he holds the degree of doctor of philosophy. He joined the Westinghouse organization in 1928 after having taught at Columbia and Princeton Universities. Dr. Condon is widely recognized as an outstanding scientist in the field of theoretical physics. He also has conducted extensive research in atom-smashing and has made a thorough study of the phenomenon of atomic power.

◆

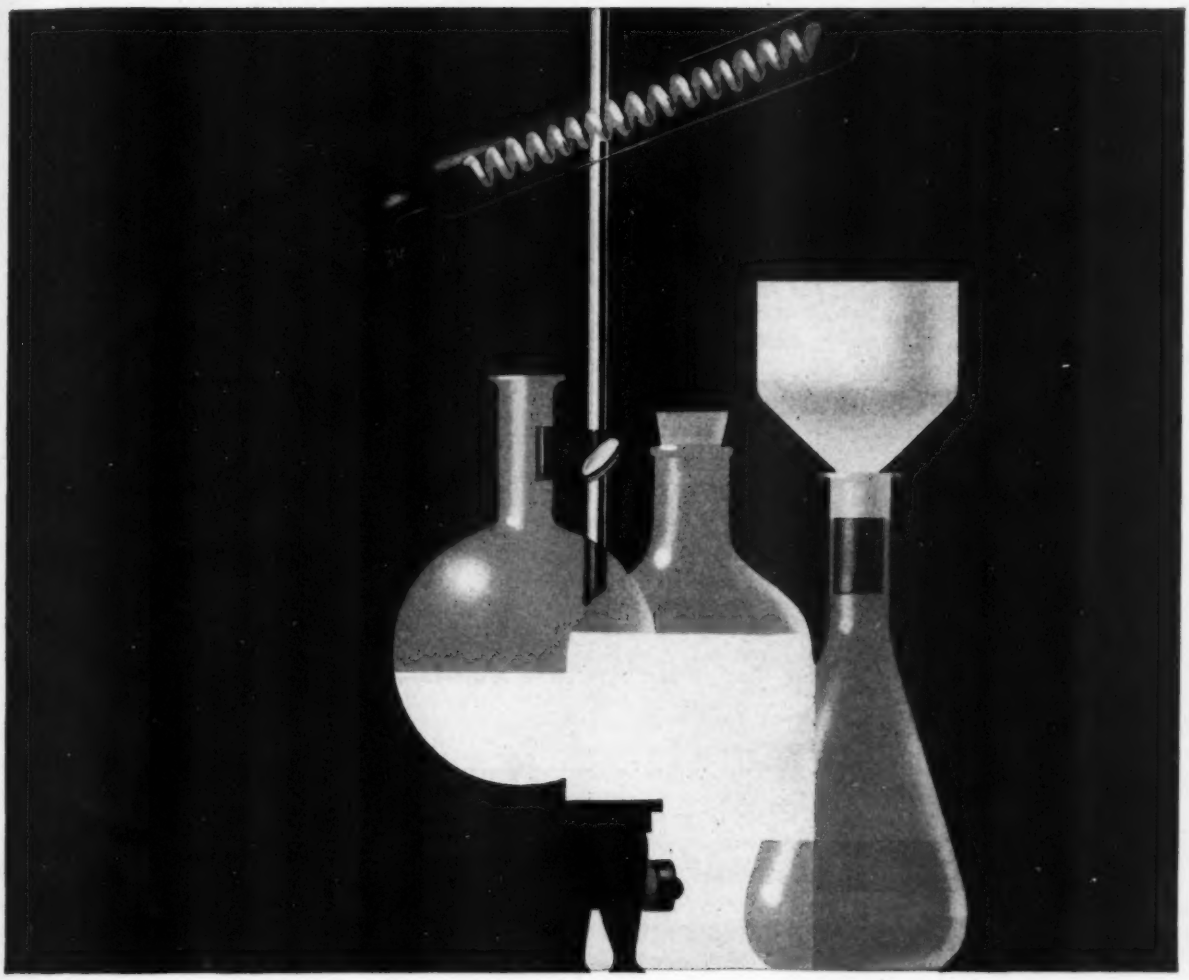
DOW CHEMICAL COMPANY MAKES STAFF CHANGES

The Dow Chemical Company, Midland, Michigan, announces numerous personnel changes, due to expanded departmental operations on account of the development of many new plastic products.

Among these changes it is mentioned that at Midland, C. F. Cummins, formerly of the Chicago office, will have charge of plastic engineering activities in molding powders; R. J. Minbiole, formerly of the New York office will handle packaging materials. P. W. Simmons also was transferred from the New York office to handle protective coating materials. F. J. Gunn of Midland assumes the handling of plastic raw materials.

A number of shifts and changes in the branch offices also have been made effective.

Recover Those Rejects With a Bauer Pulper
The Bauer double-disc pulper is best by actual use — scores of installations — for salvage of rejects and screenings. The action is fast, the treatment thorough, the resulting stock uniform and free, and not cut.
Bauerized stock is ready for the paper machine, usually by-passing the jordans.
If interested in turning what would normally be waste into A-1 stock, quickly covering cost of the installation — building up a profit for years thereafter—then install a double-disc BAUER pulper.
ARMY E NAVY
Bauer
PULPER
THE BAUER BROS. CO.
Bauer
The BAUER BROS. Co.
SPRINGFIELD, OHIO
AVOID ALL WASTE • BACK THE ATTACK • BUY BONDS



STAINLESS STEEL... METAL Par-excellence FOR THE PROCESS INDUSTRIES

THERE are a lot of new faces along the street—high-octane gas, synthetic rubber, magnesium, dehydrated foods, war chemicals and explosives, just to name a few.

But Allegheny Metal kept pace—with new grades, new techniques to meet the requirements for processing these products. There was the need for high resistance to chemical attack, and to oxidation at heat—the need for great strength, long life, easy cleaning and freedom from contamination—requirements, all of them, that stainless steel answers best.

If—somewhere along the line in the manufacture of food and dairy products, drugs and chemicals, oil and plastics, textiles and paper—your plans would be profited by a steel with Allegheny Metal's special qualifications, let us help you develop them. Allegheny Ludlum Steel Corporation, Brackenridge, Pa.

Allegheny Metal is also handled and stocked by all Joseph T. Ryerson & Son, Inc. warehouses

W&D 9370-C

ALLEGHENY METAL

The Time-Tested Stainless Steel

REMEMBER THE NAME TODAY FOR THE NEEDS OF TOMORROW

Necrology

EDWARD BAUSCH

Chairman of the board of Bausch & Lomb Optical Company, Rochester, New York, passed away July 30. He was 89 years of age.

Mr. Bausch was indeed a pioneer. As son of John Jacob Bausch, co-founder of the company, he designed

Edward Bausch

and built his first microscope when he was 18 years old. He lived to see the optical shop grow into an international industry. Many patents had been issued to Mr. Bausch, the most famed of these was a diaphragm shutter which brought the camera into popular use.

◆

▶▶▶ A well-known safety and athletic director passed away in Kalamazoo July 20. *Frank W. McQueeney,* connected with the Sutherland Paper Company, passed away suddenly just as he had arrived at his desk for the day's work. Mr. McQueeney was a popular figure in Kalamazoo circles. He had been with the company since 1934; prior to that he was connected with Bryant Paper Company in Kalamazoo. He was 61 years of age. Surviving are the widow and two daughters.

◆

▶▶▶ Son of the founder of Paterson Parchment Paper Company, Bristol, Pennsylvania, *Edgar D. Leonard,* assistant general manager of that company, passed away recently at the age of 50 years. He had been with the company for 25 years. Surviving are the widow, two sons and two daughters.

◆

▶▶▶ A former officer of the Sandy Hill Iron and Brass Works, Hudson Falls, New York, *W. J. Elliot Simpson* passed away July 25 at the age of 67. He had been in poor health for some time. Mr. Simpson was for several years with the United Paperboard Company, Thompson, New York, before becoming associated with the Sandy Hill company. Prior to his illness he had been assistant secretary-treasurer of the Sandy Hill company. He is survived by a daughter and a son.

◆

▶▶▶ Well known in the paper industry, *Thomas Rand Humeston* passed away at his home in Holyoke, Massachusetts, July 10, at the age of 81 years. When he retired in May, 1941, Mr. Humeston was assistant manager of the sample department of the American Writing Paper Corporation. He had been with that corporation and its predecessor companies for 63 years. He is survived by his widow and one son.

◆

EDMUND H. LUNKEN

At the age of 83, Edmund H. Lunken, chairman of the board of The Lunkenheimer Company, Cincinnati, Ohio, passed away on July 19 at his summer home in Michigan.

Mr. Lunken was the son of Frederick Lunkenheimer, founder of The Lunkenheimer Company. At the age of 16 he entered his father's business which had been established in 1862. Upon the death of his father in 1889, he assumed leadership of the company and remained its senior officer until his death. In 1892, he legally changed his surname to Lunken, but did not change the name of the company.

◆

JOHN H. VAIL

On July 13, John H. Vail, manager of the specialty bag division of the Union Bag and Paper Corporation, Savannah, Georgia, passed away at the age of 59.

Mr. Vail had formerly been Chicago manager for the Union Bag and Paper Corporation, and a number of years ago he was superintendent of the company's plant at Hudson Falls, New York.

He is survived by his widow and a daughter.

◆

DR. FRANK J. TONE

Chairman of the board of The Carborundum Company, Niagara Falls, New York, passed away July 26. He was 75 years of age.

Dr. Tone was graduated from Cornell University in 1891 with the degree of electrical engineer. His connection with the chemical field dates from the inception of Niagara power

Dr. Frank J. Tone

in 1895 when he became associated with Dr. Edward G. Acheson, in the development of "Carborundum," as works manager and later as president of The Carborundum Company. He retired as president and became chairman of the board in 1942.

A number of patents had been issued to Dr. Tone, and he had contributed widely to technical literature. He was awarded the initial Jacob F. Schoelkopf medal by the American Chemical Society, the Edward Goodrich Acheson medal by the Electrochemical Society, and an honorary degree of Doctor of Science by the University of Pittsburgh. His outstanding contribution to electrometallurgical field was the development of a large scale process for producing silicon metal.

◆

EDGAR HIEL BRISTOL

One of the founders of and the president of The Foxboro Company, Foxboro, Massachusetts, passed away July 24 at his home at Falmouth Heights, Massachusetts.

Mr. Bristol was born in Naugatuck, Connecticut, March 7, 1871. Upon leaving high school he became a ma-

SELF-SEALED BEARINGS

"9000-DD", with Double Metal Seals, here shown; also made as "9000-D" with Single Metal Shield.

"NORMA-HOFFMANN"
PRECISION BEARINGS
BALL, ROLLER AND THRUST

LARGER GREASE CAPACITY NO SEAL DRAG

IN "9000" SERIES (Feltless)

Interchangeable in dimensions with felt seal bearings.

Employs simplified, inwardly extending, flanged metal shields which do not rotate and cannot "foul" other rotating seal parts.

Seals are highly efficient in retaining grease in either horizontal or vertical position.

Simple seal occupies less space within bearing than felt seal, PROVIDING GREATER GREASE CAPACITY AND A MORE LASTING LUBRICANT SUPPLY.

Metal seals, though close fitting, clear recess on inner ring, ELIMINATING "DRAG" OR FRICTIONAL RESISTANCE and power loss, and providing higher starting speeds and increased efficiency. Seals cannot wear and are permanently effective.

Totally sealed against foreign matter, providing absolute cleanliness at all times.

TO WIN THE WAR—WORK—FIGHT—BUY WAR BONDS!

NORMA-HOFFMANN BEARINGS CORPORATION, STAMFORD, CONN., U. S. A.

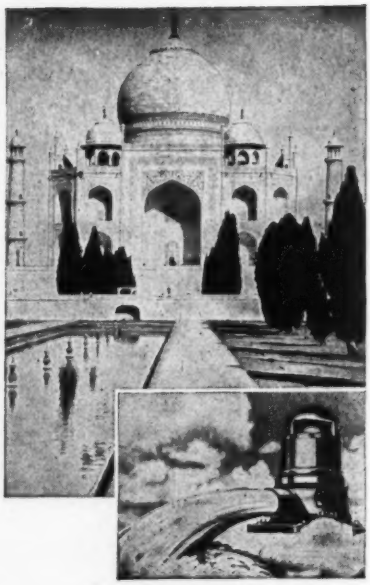
Appleton Felts

Meet all high speed production requirements of mills today—the same as they have been doing since 1890. Appleton Felts have progressed with the paper industry, year by year—that's why. They are today's standard for paper mill felts.

MAKE GOOD PAPER

APPLETON WOOLEN MILLS

APPLETON · WISCONSIN



THE SKILL

OF THE BUILDER

Needs No Praise

No one had to proclaim the merits of the man who built the incredibly beautiful Taj Mahal of India. The building itself is a monument to his incomparable skill.

Nor need any one in the Layne Organization preach the superior merits of Layne Water Systems or of Layne High Efficiency Pumps. They need only to point to any of many thousands now in operation and say—"go and see for yourself." This long used policy places all responsibility directly upon the product itself.

Each Layne Water System is a "tailored to fit" job. The size of motor, casing, shafting, bearings, pump bowls and screen mesh are determined by the actual physical and operating conditions of each installation.

The finished product is delivered—"in operation"—producing the stipulated quantity of water. Layne Companies are located throughout the territory served. This insures prompt and efficient attention when adjustments, servicing or repairs are required.

For literature, catalogs, etc., address Layne & Bowler, Inc., General Offices, Memphis 8, Tenn.

AFFILIATED COMPANIES: Layne-Arkansas Co., Stuttgart, Ark. * Layne-Atlantic Co., Norfolk, Va. * Layne-Central Co., Memphis, Tenn. * Layne-Northern Co., Mishawaka, Ind. * Layne-Louisiana Co., Lake Charles, La. * Louisiana Well Co., Monroe, La. * Layne-New York Co., New York City * Layne-Northwest Co., Milwaukee, Wis. * Layne-Ohio Co., Columbus, Ohio * Layne-Texas Co., Houston, Texas * Layne-Western Co., Kansas City, Mo. * Layne-Western Co. of Minnesota, Minneapolis, Minn. * International Water Supply Ltd., London, Ontario, Canada

LAYNE

WELL WATER SYSTEMS

DEEP WELL PUMPS

BUILDERS OF WELL WATER SYSTEMS FOR INDUSTRIES AND MUNICIPALITIES

chinist, later a tool-maker and subsequently production manager of the instrument company headed by his father. With his brother, Bennet B. Bristol, he withdrew in 1908 to organize the Industrial Instrument Company, which on January 1, 1914, become The Foxboro Company. He served as the company's president throughout its history. More than forty patents were recorded to his credit.

He is survived by his widow, a son, Benjamin H. Bristol; and four daughters.

◆

FRANK G. HALL

Associated with Stein-Hall & Company, New York City, for more than 50 years, Frank Griswold Hall, its president, passed away July 30 at Hanover, New Hampshire, near his summer home. He was 73 years of age.

Mr. Hall was a pioneer in the development of the industrial uses of starch in paper and textile mills and as adhesive gums.

In 1891, Mr. Hall entered the employ of the Stein-Hirsh Company (as the company was then known) as an office boy. He became a salesman and in the nineties was named a partner. In January, 1918, the company was changed to include his name and he was appointed vice president and general manager. Upon the death of Mr. Stein in 1918 he was elected president.

The widow and four daughters survive.

◆

GEO. A. THOMPSON

At his home in Holyoke, Massachusetts, George A. Thompson passed away July 11. He was 75 years of age, and was a retired superintendent of the Whiting Paper Company, with which he had been associated for 55 years.

As a boy, Mr. Thompson began his papermaking career with Winona Paper Company, which later became the Gill Division of American Writing Paper Corporation. At the age of 16 he joined the Whiting Company when it was operated by William Whiting, Congressman. It is said that Mr. Thompson taught the papermaking business to the late William F. Whiting, who served as Secretary of Commerce under President Coolidge, and the younger Mr. Whiting's three sons.

Surviving are the widow, five sons and five daughters.

THE

SMITH & WINCHESTER MFG. CO.

• Since 1828 •

continuously
we have served the

PAPER INDUSTRY

with the finest in

PAPER MILL MACHINERY

During the progress of World War II, our plant and facilities have been devoted primarily to the war effort.

Replacements, or repairs to your machines, can be furnished under required priority rating.

"Undercut" Trimmers
Paper Bag Machinery
"Rainstorm" Shower Pipes
Stuff Pumps — Jordans

—Office and Plant—
South Windham, Conn.

THROW MOLD OUT FOR KEEPS!

DOWICIDES CONTROL
Mold Decay Termites

Mold costs money. Don't feed it by permitting the existence of conditions that promote its growth . . . throw it out for keeps. No matter what your problem, in this respect, one or more of the Dowicide family of seventeen products is ready to help you in two ways . . . to bolster the resistance of the finished product against fungi and bacteria . . . to prevent malicious growth during processing.

Dowicides are economical . . . thoroughly tested . . . proved by years of industrial acceptance.

In the paper industry, Dowicides have proved their value in several ways:

First, they protect stock from spoilage due to mold attack during processing or in storage.

Second, they can be incorporated into the product to produce mold-resistant papers, for wrapping many materials having a high moisture content such as soap.

Third, they lengthen felt life by combatting mold attack.

Fourth, they are effective adhesive preservatives.

Dowicide products are economical . . . effective . . . easy to apply. For further information on how to throw mold out for keeps, write to the Dowicide Division.

THE DOW CHEMICAL COMPANY
MIDLAND, MICHIGAN

New York • Boston • Philadelphia • Washington • Cleveland
Detroit • Chicago • St. Louis • Houston • San Francisco
Los Angeles • Seattle

DOWICIDE

GERMICIDES AND FUNGICIDES

Among the many Dow products serving the Paper Industry are: Methocel, Ethocel and Caustic Soda.

DOW
CHEMICALS INDISPENSABLE TO INDUSTRY AND VICTORY

LUNKENHEIMER VALVES

Spell "Low Maintenance"

Fig. 16
"Renewo" Globe

Fig. 123
"N-M-D" Globe
(Non-Metallic Disc)

Long service life and low maintenance have ever been the goal of Lunkenheimer design. Ask users why they prefer Lunkenheimer Valves and their answer is universal—"they're built to last and give the least amount of trouble."

These staying qualities are particularly important when production is running at previously unheard-of tempos — when "time out" is figured in loss of vitally needed equipment, rather than mere dollars. Lunkenheimer Valves are helping many a maintenance crew do a better job easier.

Illustrated are just a few of the many types of valves in the Lunkenheimer line—bronze, iron, steel and corrosion-resistant alloys—for all prevailing pressures and temperatures.

Your Lunkenheimer distributor is always ready to help you with your maintenance, repair and operating problems. His facilities and experience are at your call.

Fig. 2125
Bronze Gate

Fig. 1640
"King-clip" Gate

Fig. 1430
Iron Body Gate

Fig. 1938
Steel Gate

ESTABLISHED 1862

THE LUNKENHEIMER CO.

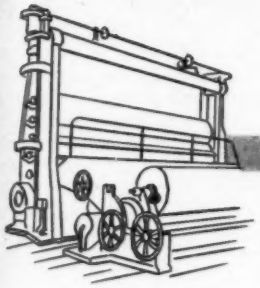
"QUALITY"

CINCINNATI 14, OHIO, U. S. A.

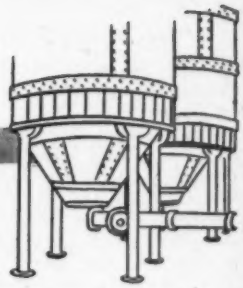
NEW YORK 13 CHICAGO 6
BOSTON 10 PHILADELPHIA 7

EXPORT DEPT. 318-322 HUDSON ST., NEW YORK 13, N. Y.

BRONZE, IRON, STEEL AND CORROSION RESISTANT ALLOY VALVES, 125 TO 2500 LB. S.P.
BOILER MOUNTINGS, LUBRICATING DEVICES, AIRCRAFT FITTINGS



Practical SHORTS



Readers are invited to submit short, practical articles for this department. The items should be original and should relate to ways and means of handling production and maintenance jobs. Where possible, articles should be illustrated. Rough sketches only are required. Payment will be made for acceptable items upon publication.

Setting Press Rolls

Various theories have been advanced concerning the positioning of top press rolls.

For many years, erectors, when setting a press, set the top roll on the same vertical center line as the bottom roll. This practice was followed by some mills long after machines were running above 500 feet a minute.

However, it was discovered that water from a line press could be removed with less crushing of the sheet if the center of the top roll was an inch or more in the direction of the couch, as compared with the bottom roll. In the case of a reverse press, the top roll would be set in the same relative position with the bottom roll but in the direction of the dryers rather than the couch.

It also was observed that a high setting of the last felt roll over which the felt travels before entering the nip of the press resulted in still better water removal.

With the introduction of the suction roll, standard presses gradually became supplanted with suction presses. Here again, theories developed with reference to the setting of top rolls.

One theory was that the intake of the suction box within the bottom roll should be centered with the vertical center line of the roll and that the line pressure of the top roll should be immediately over the intake.

Another theory was that the top roll should be set on the same vertical center line as the suction roll and that the suction box intake should be located toward the dryer section from this center line so that a partial vacuum would be created beneath the sheet and felt upon leaving the press.

A third theory was that the suction box intake of the first press should be set on the vertical center line of the bottom roll and that the top roll should be set toward the dryer section an inch or so from this line.

A top press roll and the suction box intake of a first press can be set on the same vertical center if the press is set extremely high. In such a case, contact of felt and roll would be far enough away from the nip so that the vacuum would be held when the sheet covered the box. Contrarily, the arrangement could not be used with a low set press because air would find its way into the box between the felt and roll and there would be no way of sealing it.

The arrangement could be used with a second suction second press, if run in tandem, by creating a pronounced upward pitch in the felt on the front side of the press, and drawing the sheet low before it enters the press.

If papermaking were an exact science, there would be no guesswork in determining the proper adjustments of press rolls or suction boxes of suction press rolls. As it is, the only logical method to follow is to set top rolls and suction boxes in positions where practice has shown them to function best.

There is much merit in having the suction box on the dryer side of the vertical center line of the press. The largest objection to such practice is that the sheet will not seal the suction box during a break and take over unless it is blown down onto the felt.

The theory of setting the suction box of the first press on the vertical center line and setting the top roll in the direction of the dryer section from this line is sound. In this hook up, part of the intake is immediately under the top roll, and the rest is there to take the water which ordinarily would be in the nip—certainly a part of the function of a suction roll.

Such an arrangement makes it possible to run a low press. In any event, the first felt must contact the bottom roll far enough forward so that the box is sealed when the sheet is in the press.

The area of line pressure of the two rolls is an extremely narrow one. Therefore, unless the felt and paper together contact the bottom press roll in such a manner that the shell immediately outside the intake space is covered, there is going to be a loss of vacuum in the suction box.—ARCHIE MCCAFFERY.

◆

Vibration Applications of Flexible Metal Hose and Tubing

To absorb vibration, the tubing should be installed in a plane parallel to the direction of vibration, and the fittings so located as to provide a minimum bend of 45 degrees in the tube. The length shall be sufficient to prevent undue strain, and not so excessive as to permit whipping of the tube in service. For rough calculations the length of the tubing should be equal to 25 times the inside diameter for each quarter inch of relative vibration.

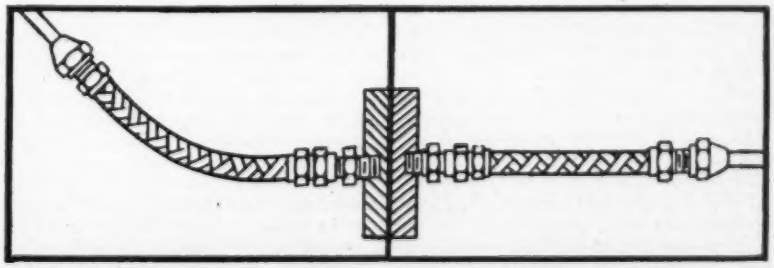
To dampen vibration, the tubing may be installed in a straight line, but where possible, however, a bend is desirable. The length shall be sufficient to permit the tubing to be in a relaxed condition in normal position, and not in operation.—TITEFLEX, INC.

◆

Piping and Fixtures for Handling Chlorine

Copper tubing built for 500 lb. psi working pressure is the preferred material for connecting chlorine containers to permanent pipe lines.

Black iron pipe is recommended as the preferable material for dry gaseous chlorine or dry liquid chlorine, although steel, copper, and other metal piping that will resist high pressure can be used. While standard-weight pipe is satisfactory for all normal chlorine pressure, the extra strong grade is recommended as safer and more practical since abnormal temperatures caused by fires, mechanical strains due to misplacements, and corrosion produced by moisture are all factors to be considered. Liquid chlorine lines should be as free from bends and obstructions as possible and should have a good chlorine line valve at the tank car as well as at the point of use. Liquid chlorine lines equipped with valves at each end should be provided with a liquid expansion chamber so that, if both valves are closed and the line is exposed to higher temperatures, the expansion chamber will provide for the increased volume and prevent hydrostatic rupture. A standard 100 lb. chlorine cylinder inverted and mounted vertically at the highest elevation along the liquid chlorine unloading line serves very well as an expansion tank for most installations. Specific recommendations will be made on request. Where maximum discharge rates are re-



To absorb vibration: Left—Minimum 45-deg. bend. Right—Straight line.

quired, pipe friction losses should be reduced by using lines of one inch or more in diameter.

Hard rubber pipe is satisfactory for chlorine gas, but should never be used for conveying liquid chlorine. Never convey chlorine gas in hard rubber pipe at cylinder pressure. The pressure should first be reduced to less than 50 lb. psi.

Lines conveying gaseous chlorine should be run on a continuous upgrade so that any re-liquefied chlorine will flow back into the containers. Wherever this is impractical, drip legs should be provided in the low points of the pipe line. These legs should terminate in pockets, permanently sealed, to assure evaporation of the condensed chlorine. *Blow-off cocks or other bleeding arrangements are not recommended; they are dangerous and unnecessary.*

Pipe joints may be made with standard couplings, unions, or flanges. Standard ammonia type flanges are preferable, since their use permits easy inspection and repair to lines. In cutting threads for chlorine piping extreme care should be taken to obtain clean sharp threads—*take two or three cuts, if necessary, to produce the desired perfect thread. It will save time in the end.* Plants operating extensive chlorine piping systems have found it advantageous and most satisfactory to provide pipe dies solely for use on chlorine piping. The recommended dope for pipe joints is linseed oil and white lead, which should be applied only to the tail threads of the male thread. For permanent joints litharge-and-glycerin is satisfactory. Gaskets should be of lead containing 2% to 3% antimony or of compressed asbestos composition. Garlock 900, or equal. *Never use rubber gaskets in liquid chlorine lines.*

Valves should be designed for chlorine service. The standard Chlorine Institute valve used on ton containers can be adapted to many installations. Where larger valves are necessary, those of the globe type with forged steel or special brass bodies of sturdy design, plug type seats and discs, Monel metal stems, outside screws and yokes, and deep packing recesses should be employed. Graphited asbestos rope or special ring packing made of cotton cord impregnated with rubber and lubricated with beeswax and graphite are recommended for packing.

Gauges for chlorine should be of the diaphragm type and for general service should have a range form 0 to 160 lb. psi.

Equipment and lines carrying dry chlorine should not be unnecessarily exposed to heat. It is dangerous, due to increased pressure as well as the hazard of dry chlorine attacking the hot metal. Where evaporators are used, the temperature should be limited to 160 Fahr.

Wet chlorine is very corrosive to all of the common metals. Materials coming in contact with it must be of earthenware, glass, rubber, one of the special high silica iron alloys, or noble metals. The handling of wet chlorine is an individual plant problem and specific recommendations can be made only after a survey and study of the various factors involved.—*Chlorine* (6th Edition), THE PENNSYLVANIA SALT MANUFACTURING COMPANY.

Ladder Maintenance

Care of ladders is an important safety factor. Here are some good maintenance suggestions:

1. Inspect ladders at frequent regular intervals; if any ladder is found defective, either repair or discard it.

2. Use shellac, varnish, or two coats of oil as a preservative; paint conceals defects.

3. Keep ladders clean.

4. Do not lay ladders on wet ground, or leave them exposed to the weather. Ladders lying on the floor may cause workers to trip and fall; or they may be run over by trucks and damaged.

5. If ladders with metal parts are exposed to acid fumes, inspect these parts frequently.

6. Roughen metal ladder rungs to prevent slipping.

7. Never leave a ladder where it may fall.

8. Store ladders in a cool dry place, either lying on their sides or hanging by their rails from several wall brackets in a horizontal position. Take care, however, that these suspended ladders do not warp. —*Safety Instruction Card No. 340,* NATIONAL SAFETY COUNCIL.

◆

Procedure for Taking a Boiler Off Line

1. A boiler should never be drained while there is still sufficient heat to bake sludge on the boiler tubes without immediately washing the boiler.

2. When the boiler has been taken off the line and as it is cooling, the boiler should be blown down heavily and filled with hot feed water. This operation of blow and fill should be repeated several times and as frequently as possible, particularly when the boiler water is high in suspended solids, until the boiler is cooled and ready to open.

3. Immediately on draining the boiler, the manhole or manholes should be knocked in and a high pressure hose employed to wash out sludge. By this procedure, the sludge can be washed out while still in a fluid form. If you are not ready to wash out the boiler immediately on draining, there may still be sufficient heat left in the boiler setting to cause baking of residual sludge and therefore the boiler should not be drained. However, never leave the boiler filled with water for any extended period of time without taking proper measures to prevent corrosion and pitting during this period.

4. If the boiler is not properly removed from the line, the soft sludge will dry out and will bake on the tubes and it may then be necessary to turbine the tubes in order to remove this baked sludge.—W. H. AND L. D. BETZ.

◆

Check List for Triplex and Rotary Pump Operators

Triplex Pumps

1. No water delivered
   (a) Priming—(Fill valve boxes and pump cylinders with water)
   (b) Suction line completely plugged up
   (c) Suction Lift too high (over 22 ft.) Check with gauges
   (d) Not enough positive suction head for hot water, volatile or thick liquids

2. Not enough water delivered
   (a) Priming—Fill valve boxes and pump cylinders with water
   *(b) Speed too low
   (c) Foreign matter under valves
   (d) Suction line partially plugged up
   (e) Suction lift too high (over 22 ft.) Check with gauges
   (f) Not enough suction head for hot water, volatile or thick fluids
   (g) Mechanical defects:
   Valves worn or warped and do not seat properly
   Plunger Packing worn
   Plungers worn

3. Not enough pressure
   (a) Air in water
   (b) Foreign matter under valves
   (c) Mechanical defects:
   Valves worn or warped and do not seat properly
   Plunger Packing worn
   Plungers worn

4. Pump pounds
   (a) Air in water
   (b) Suction Lift too high (over 22 ft.) Check with gauges
   (c) Surges in suction line (especially on booster pumps)
   (d) Not sufficient suction head for hot water, volatile or thick liquids
   (e) Excessive speed
   (f) Speed too high for thick, viscous or hot liquids, so that pump barrel cannot fill
   (g) Pressure greater than catalogue rating of pump. Excessive strain on moving parts and frame
   (h) Mechanical defects:
   Loose main bearings
   Loose crossheads
   Loose crosshead pins
   Loose crank pins

5. Pump takes too much power
   (a) Speed too high
   (b) Higher pressure than catalogue rating of pump
   (c) Liquid heavier than originally specified; check viscosity and specific gravity

(*) When connected to electric motors, check up whether motor is across the line, wiring correct, and receives full voltage.

(d) Plungers packed too light
(e) Mechanical defects:
Poor fitting of moving parts
Bearings too tight
Gears not properly assembled

Rotary Pumps

1. No water delivered
(a) Priming—See that casing and suction pipe are filled with liquid
(b) Suction line completely clogged
(c) Suction lift too high (Suction pipe may be too small or long causing excessive friction loss.) Check with gauges
(d) Wrong direction of rotation
(e) Not enough positive suction head for hot water, volatile or thick liquids

2. Not enough water delivered
(a) Priming
*(b) Speed too low
(c) Suction Line partially clogged
(d) Suction lift too high (Suction pipe may be too small or long, causing excessive friction loss.) Check with gauges
(e) Not enough positive suction head for hot water, volatile or thick liquids
(f) Liquid too thick or viscous. Check viscosity

3. Not enough pressure
(a) Air in water or liquid
(b) Mechanical defects:
Cams, gears or other working parts worn—too much clearance
Stuffing box packing worn

4. Pump makes too much noise
(It must be borne in mind that some noise is always natural in a rotary pump)
(a) Air in water or liquid handled
(b) Speed too high—especially when handling thick or volatile liquids
(c) Too much suction lift—pump not filling with liquid
(d) Mechanical defects:
Cams, gears, or other working parts worn, loose or broken

5. Pump takes too much power
(a) Speed too high
(b) Discharge pressure higher than originally specified
(c) Liquid heavier than originally specified. Check specific gravity and viscosity
(d) Stuffing box packing too tight
(e) Mechanical defects:
Poor fit of working parts—binding at some point
Bearing too tight
Misalignment between pump and driver
—GOULDS NEWS.

◆

Arc of Belt Contact on Any Small Pulley or Sheave

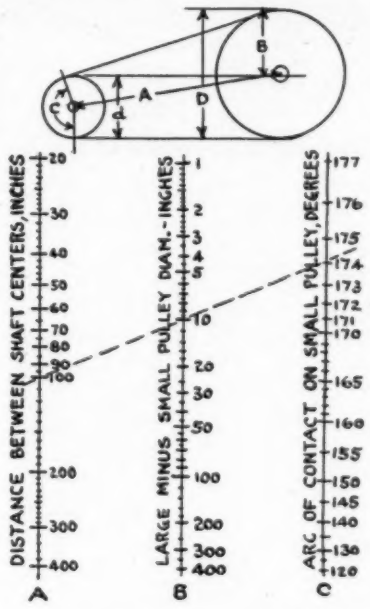
This chart quickly gives the arc of belt contact, in degrees, on any small pulley or sheave, of any open belt drive, under most paper mill working conditions.

Referring to the sketch above the chart, "A" is the distance between shaft centers in inches, and column "A" of the chart shows such distances all the way from 20 to 400 inches.

"B" in both the sketch and chart represents the large pulley diameter, minus the small pulley diameter, also given in inches.

Now run a straight line through the known value in "A" and the known value in "B" and the intersection of that straight line with column "C" gives the arc of contact on the small pulley or sheave "C", as indicated in the sketch.

For example, the dotted line drawn across the chart shows that if the distance between shaft centers is 100 inches (column A), and the difference in pulley diameters is 10 inches (column B), the arc of contact is slightly more than 174 degrees.



Should it be desired to check the figures arithmetically, it can be done in this way: Multiply the difference in diameters in inches by 58; divide that product by the distance between shaft centers in inches; and then subtract the quotient from 180. The result is the arc of contact on the small pulley or sheave in degrees.

This result is not "absolutely perfect," but it is a close approximation—close enough for all ordinary belt drive purposes. It is applicable to V-belts as well as to flat belts. For V-belts use the "pitch diameters" of the sheaves.—W. F. SCHAPHORST, M. E.

◆

The Baume and Twaddell Scales

In nearly all instances, the specific gravity or density in water of solutions of pure acids, alkalies and salts varies in proportion to the amount of these constituents present. Advantage is taken of this fact in determining the strength of many commercial solutions by obtaining their densities. The method is rapid, sufficiently accurate for most purposes and avoids the necessity of making a chemical analysis.

The terms density and specific gravity, while strictly not synonymous, are generally used interchangeably to represent the weight of a volume of liquid compared with the weight of an equal volume of water. Since the densities of liquids vary with changes in temperature, the temperatures must always be specified. Chemical manufacturers in the United States have mutually agreed on the use of the temperature 60 Fahr. as a basis for specific gravity and, consequently, most tables in this country are prepared on that basis.

A density or specific gravity figure when used in the chemical industry implies, therefore, the weight of a volume of liquid at 60 Fahr. as compared with the weight of an equal volume of water also at 60 Fahr. This relation is indicated in tables in this way:

$$\text{Sp. Gr.} = \frac{60}{60 - \text{Fahr.}}$$

While specific gravity may be expressed by figures such as 1.0762, it is the usual custom in the chemical industry to employ the arbitrary Baumé scale. The figures given on this scale are somewhat easier to remember since the number of decimal places used is reduced. Another scale, the Twaddell, is used in England and in the textile industry in this country. The relation of these two scales to specific gravity is as follows:

$$\text{Degrees Baumé} = 145 - \frac{145}{\text{Sp. Gr.}}$$

(for liquids heavier than water)

$$\text{Degrees Twaddell} = 200\ (\text{Sp. Gr.} - 1)$$

The Baumé Scale is also applied to liquids lighter than water; i.e., those which have specific gravities less than 1. In this case, the scale starts at 10 degrees corresponding to 1.0000 specific gravity and increases as specific gravity decreases. The relationship of this scale with specific gravity is as follows:

$$\text{Degrees Baumé} = \frac{140}{\text{Sp. Gr.}} - 130$$

(for liquids lighter than water)

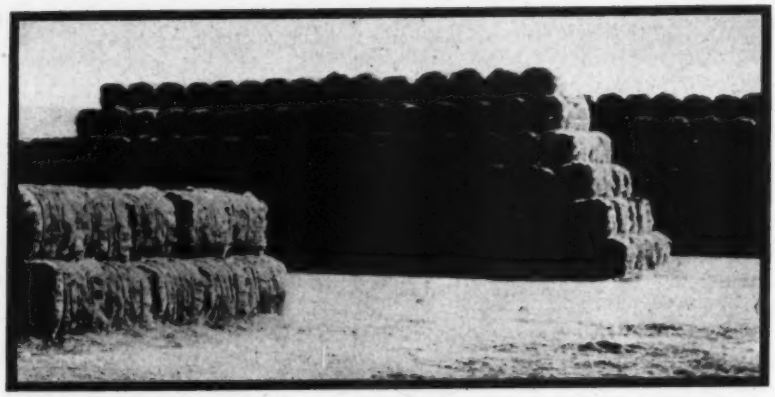
The Twaddell scale is not used for liquids lighter than water.—GENERAL CHEMICAL PRODUCTS BOOK.

◆

Dies for Brass Pipe

Although it appears to be common practice to use new dies only on brass pipe for some time and later when they have become slightly dulled to use them only on iron and steel pipe, it is considered best practice to purchase dies especially made for brass pipe and use them only on brass pipe, keeping them separate from their regular dies for iron pipe. This is considered the best way to secure perfectly tight screw thread joints in brass pipe and it costs no more than the old method of using the same dies on both iron and brass pipe.

Special brass pipe dies should not be too thin. Some makes are of such thickness that when the pipe end is flush with the face of the die, the thread will be cut the correct length, and the user sees exactly when to stop the threading process. Sometimes the leading edges of the dies are so sharp that they cut deeply and catch in the brass, and it is impossible to cut threads without distorting the pipe end. In such a case, two or three strokes of a fine whetstone across the face of the dies tending to remove the excessive sharpness will correct the difficulty. This trick of the trade will often save trouble which is blamed either on the dies or the pipe.—COPPER AND BRASS RESEARCH ASSOCIATION.



Esparto grass baled for shipment, Algeria. (Photo from the National Archives, Division of Photographic Archives and Research.)

Esparto Grass*

MARGARET E. WAMBSGANSS
Industrial Project Unit Bureau of Foreign and Domestic Commerce

▶▶▶ MILLIONS OF ACRES in the rugged, almost sterile, areas of Tunisia, Algeria, Morocco, and Tripolitania are verdant with an abundant growth of esparto—the grass of many uses.

It can be used in coverings for man's head and his feet; in carpets for his floors, and brooms to sweep them; as food for his cattle; as fuel; and, of particular importance, as a base for paper. It is a constant source of income for many.

Natural Habitat

Esparto grass (*Stipa tenacissima*) is known also as Spanish grass, halfa, or alfa. Owing to its hardiness, it flourishes on the vast wastes of the North African steppes, and on several thousand acres of the Saharan stretches, providing a unique resource and natural wealth. Spain has a vast territory which produces esparto; in fact, it was exploited in that country even earlier than in Africa. Most abundant growths are in dry, sunny areas having sandy soil. Climatic and ground conditions in the United States most comparable to the esparto areas of Africa are in Arizona, New Mexico, and western Texas.

Apparently esparto grass does not exist under cultivation, but grows wild in the plateau regions of the Barbary States and in southern Spain. A foreign authority reports that it has been planted in some sections of north Africa as a means of land reclamation, but no information is now available on that project.

Another variety of esparto is *Lygeum spartum*, a grass with stiff, rushlike leaves, which grows in these same areas of Africa.

Esparto grass resembles ornamental feathergrass of gardens. It attains a height of 3 to 4 feet. Stems are cylindrical and coated with short hairs. The leaves vary from 6 inches to 3 feet in length, and are gray-green in color. This grass can be raised from seed, but 12 to 15 years are required before it is ready for harvest.

The leaves contain an extremely fine and tough fiber which is easily detached and can be very readily separated from the rest of the plant. The leaves are gathered during the dry summer months, because at other times their adherence to the stems is so firm that an attempt to remove them may uproot the entire plant.

Growth areas of esparto cover at least 12,000,000 acres in Africa, but not all are used commercially. Many areas remain untouched because of their remoteness from transportation facilities and the consequent high costs of harvesting and transporting.

Esparto was first used for papermaking on a small scale in France, but the esparto paper industry did not reach large proportions until its introduction into England and Scotland. It appears that in the late fifties Thomas Routledge, of Eynsham, in Oxfordshire, discovered that esparto grass gave a good yield of fiber. After 5 years of experimenting he succeeded in making satisfactory paper, and patented his process for digesting and bleaching esparto.

Previously, the chief raw material for paper making consisted of rags—discarded and worn-out remnants of clothing. In the early sixties, demand for paper mounted incredibly and the supply of rags was entirely inadequate. This gave impetus to the Routledge process, which was adopted with enthusiasm. Until the late sixties all esparto came from Spain, but soon new sources were tapped and the North African variety came into prominence. Papers from that period which are still in existence are reported to be in perfect preservation.

For use in paper, esparto leaves should be gathered before they are quite mature; however, if too young, the paper is likely to have a semitransparent appearance. After all roots, flowers, and weeds are removed, the remaining material is boiled with caustic soda, washed, and bleached with a chlorine solution.

Esparto fibers are from 1 to 1½ millimeters in length, and can be used at full length, thus permitting their bulk and flexibility to remain in the paper. The fineness of the fiber contributes to the production of a closely woven paper, excellent for writ-

(*) Abridged from article published in the July 8 issue of *Foreign Commerce Weekly*.

The Use of
TIDEWATER Red Cypress
In Industry--

Many maintenance men, construction engineers, or chemists are called upon to solve problems in maintenance lay-outs that require special information to correct deterioration of tanks, troughs, ceilings, side walls, or other portions of the plant. Call upon us to furnish information on the use of Cypress. Many times, stubborn conditions can be corrected by the use of proper materials, the right grade, and the correct installation. Let us help you as we have done in the past for many industrial plants whose problems have been most perplexing.

On large tank installations, we recommend that you see your local tank builders for suggestions on installation. On troughs or small knock-down tank requirements, we will gladly furnish you prices. Write for details.

TIDEWATER Red Cypress
Can Be Furnished Promptly from St. Louis Stock
FLEISHEL LUMBER COMPANY
4235 DUNCAN AVE. • ST. LOUIS 10, MISSOURI • NEwstead 2100

ing and printing. The solid structure of esparto is said to be comparable to that of flax fiber.

Esparto paper has a velvety finish, fine texture, firmness, and opacity, with slight responses to changes in atmospheric humidity. It is very popular in Great Britain, which country before the war also exported large quantities to China, Japan and continental Europe.

Harvesting and Marketing

A major difficulty in gathering esparto is that hand-picking is necessary. Harvesting ordinarily is done by numerous nomadic Arabs who arrive in the esparto regions at the appropriate season. After pitching their tents, men, women, and children, of all ages, gather the grass and tie it into bundles for shipment. These bundles are then brought to the weighing sheds and the individual workman is immediately paid according to the quantity registered by the scales. Additional income is often obtained by the nomads when they transport the huge bundles on the backs of camels to the nearest railroad connection.

Most esparto growth areas are rented to individuals or organizations for nominal sums. Only about 50,000 to 60,000 acres are privately owned, the remainder being the property of communes or of the State.

A large segment of the North African population profits from exports of the grass which in Algeria in the early 1930's represented many millions of francs.

Harvesting of esparto is carried on in inverse ratio to the success of other, better-paying, crops. When cereal and vegetable crops are plentiful and the remuneration high, the nomads are little interested in esparto; but when those crops are poor, production of esparto soars.

Recently, other means of livelihood have become so numerous and attractive that output of esparto has suffered intensely. In fact, production has been below normal ever since opening of hostilities in 1939. For this reason, figures after 1938 are of little value.

Imports and Exports

As early as 1870, the United Kingdom imported 42,000 metric tons of esparto grass. Ten years later 80,000 tons were purchased. Just prior to World War I, approximately 110,000 tons were imported, and this figure had increased to 355,319 tons in 1937, valued at more than £1,000,000. During the 1930's, about 100,000 tons of esparto paper were produced annually in the United Kingdom, reports a British trade publication.

In 1921 a group of French manufacturers organized a company and obtained a concession of large acreage of esparto south of Algiers. Manufacture of pulp was begun in 1924 in a former powder factory in the Rhone Valley. By 1932, from 20,000 to 30,000 tons of esparto were imported annually, and about 15,000 tons of pulp were produced yearly.

Algerian exports of esparto grass from 1934 to 1938 averaged 189,322 metric tons. Tunisia exported 38,375 tons in 1936, and 50,121 tons in the preceding year; Morocco exported 42,142 tons in 1937 and 36,804

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Naturally, you expect a rugged, long-wearing Morris pump to cost more than a lighter pump. But it pays out in the end. That's because a Morris Slurry Pump, in handling caustic liquors, gives you higher maintained efficiency over longer periods of continuous operation — *with fewer shutdowns for maintenance.* And it cuts power, labor and maintenance costs to a definitely lower figure on a year-in-year-out basis.

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Morris Slurry Pumps — with 75 years of hard, practical experience behind them — have more metal where metal counts most. And their exclusive features reduce speed, vibration and abrasive wear.

Take the *hydraulically-balanced pressure design* of the patented Morris impeller as just one example. That impeller builds up a counter pressure at the suction side, holds down eddy losses, and restricts the circulation of corrosive or abrasive materials between the suction shroud and the suction disc — *greatly increasing the effective life of the pump.*

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Used extensively for handling black, green and white liquors, Morris Slurry pumps are consistently out-lasting and out-performing lighter pumps in paper mills all over the country. They are also adaptable for pumping viscous liquors, and are highly resistant to the corrosive action of caustics.

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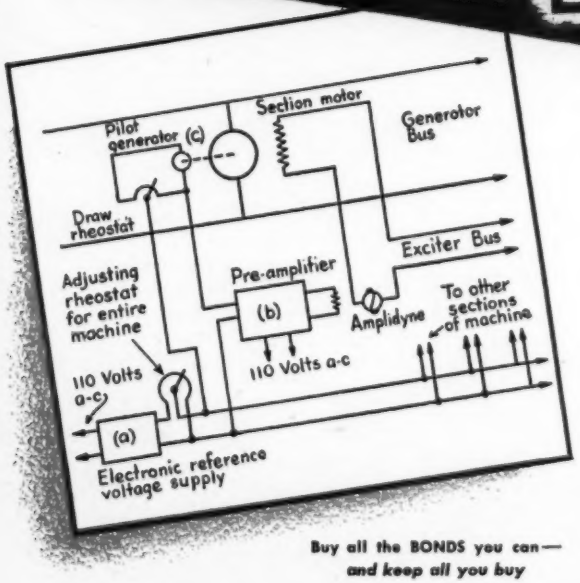

Buy all the BONDS you can—
and keep all you buy

PARTNERS THAT ONLY G.E. COULD COMBINE

This simple diagram (left) shows the basic elements of General Electric's new sectional-drive speed-regulating system. An electronic reference-voltage supply (a) is the bench mark for the entire system. The preamplifier (b) builds up any voltage differential between pilot generator (c) and the reference supply furnishing input for the amplidyne At once, the amplidyne corrects the excitation of the section-motor field to restore the desired speed. The partnership of electronic and amplidyne amplifiers has solved critical wartime control needs where simplicity and split-second response were essential. They offer a new concept of high-precision speed-control for paper machines.

GENERAL ELECTRIC

Regulated SECTIONAL DRIVE

New G-E system refines speed regulation of sectional drives — combines high accuracy and fast response

HOLDS SPEEDS PRECISELY—Speeds of the section motors are continuously held within 0.05 per cent of the preset level, despite variations in loading. A precise differential between one section and the next can be held over a wider speed range. Draw adjustments can be made smoothly.

RESPONDS LIKE LIGHTNING—To maintain section speed regardless of load changes, a voltage difference of the order of 0.1 volt is electronically amplified, then put into action by an instantly responsive amplidyne. There are no mechanical lags. Inertia is effectively counteracted.

ELIMINATES COMPLEXITY—There are no cone pulleys, belts, or carbon piles in the regulating system. Electronic voltage-reference and amplifiers are simple, standardized types that have proved their reliability on war jobs where lives depended upon them. Tubes (3 per section) are long-lasting "hard" types, and duplicate standbys go into service at the throw of a switch.

This new regulating system is just one more step in General Electric's continuous record of pioneering in the field of paper-mill drives. Centralized control, applied through sectional drives, has set new standards for wide-range flexibility and high speeds in papermaking. G-E auxiliary wet-end drives, and individual drives for chippers, grinders, stock-preparation machines, supercalenders, and winders have established exceptional performance records. G-E engineering combines, to an unusual degree, a specific understanding of paper-mill requirements with broad-based electrical experience in building and applying motors, generators, and control.
General Electric Company, Schenectady 5, N. Y.

tons in 1938. Tripolitania's exports declined after the Italian occupation in 1911, when 24,225 tons were shipped. In 1926 exports dropped to 776 tons, but improved somewhat in 1928 and 1929, amounting to 3,389 and 7,237 tons, respectively. In 1934 Italy obtained a small quantity of esparto for experimental use in the production of rayon, but because it proved more expensive than wood pulp, the project was abandoned. More than 90 per cent of all these shipments from North Africa went to the United Kingdom, where the grass is used almost exclusively in the manufacture of paper.

A quota was set by the French Government restricting the 1938-39 Algerian exports of esparto to 145,000 tons. Tunisia's exports were fixed at 90,000 tons, and those of Morocco at 65,000 tons.

At present, exports are limited by domestic consumption, labor shortages, and inadequate baling material. Transportation difficulties also are encountered, the North African railroads now transporting a maximum traffic of other goods. The United Kingdom could easily use 300,000 tons in 1944, but actual shipments may not reach a third of that amount.

Future Outlook Bright

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Convention Papers . . . Abridged

This is the sixth installment of abridgments of papers presented at the annual meeting of the Technical Association of the Pulp and Paper Industry, held in New York City, February 14-17, 1944. Succeeding issues of this magazine will contain further installments.

Streamlining Paper Mill Design

KURT WANDEL, Consulting Engineer

In the consideration of an up-to-date new mill, location, construction and layout are the three outstanding factors. Location determines the cost and supply of raw material and has a bearing on the ready distribution of finished paper and paper product. Construction and layout largely control cost of conversion. All three factors bear on the cost of investment in relation to output.

If the layout of the paper mill is considered first, it is found desirable to have all equipment arranged in as compact a manner as possible readily accessible to operators. The paper machine and other heavy machines must be on a solid foundation to function properly. These requirements suggest a single floor mill which offhand appears out of the ordinary. Nevertheless, such a layout is possible, practical in every respect, and carries with it great advantages. Figures 1 and 2 (page 634) show a one-machine paper mill, laid out on one floor level, making about 75,000 pounds of napkin and toilet paper per day. It is also capable of making M. G. papers as well as facial tissue. All machinery is mounted on concrete foundations poured into the ground. Pits of various depths are used between machine foundations and in back of the paper machine.

The drive shaft supports in the rear are set in concrete. In the stock preparation end, every piece of equipment is directly accessible. Its arrangement is compact and uses barely 50 feet beyond the paper machine.

In the operation of this mill, all stock enters at one point through a pulper which is in reality a large round chest having an impeller disk at the bottom. The operation of disintegration takes from 15 to 30 minutes, during which time the conveyor is loaded again. The capacity load of the pulper is about 3,000 pounds and constitutes the only batch operation in the mill.

The pulper empties into an adjoining chest through a stock pump mounted at the end of the chest. This pump circulates the stock in the chest, as well as a given amount through a large capacity refiner next to the pump. From the refiner, a predetermined amount of stock is bled off to the machine chest to keep same approximately at full level. The stock averages several passes through the refiner. This treatment may be varied through the setting of the refiner or the quantity of stock allowed to go through. The refiner finishes the job of disintegrating the fiber and touches it up to a degree, whereby the jordans can do the rest of the work in hydrating and preparing it for the paper machine. The stock in the machine chest is also circulated through a rotary stock pump. A smaller pipe from this pump leads to a stock consistency regulator mounted on top of the machine chest in which a certain amount of stock is thinned out to the proper consistency, and an automatic regulator furnishes the stock to the jordans while the surplus stock returns to the chest. The stock regulator is equipped with a gate operated by a reversible electric motor for more or less stock. This regulating device is operated with two pushbuttons, located at the paper machine proper and near the paper scale so that the machine tender has an opportunity to adjust his weight as soon as he determines a change is required, with no unnecessary steps taken. The jordans are mounted and piped in the usual manner. They discharge into the pit in the rear of the paper machine for mixture with the white water and chemicals.

While there may be some reasonable difference of opinion, it has been found in the operation of the mill described, that the addition of size, starch, alum, bentonite, dyestuffs, or other ingredients required for different grades of paper will produce better results if added in the mixing pit close to the inlet than when added in the pulper. Since such was found to be the case, this fact was taken advantage of by installing automatic feeding hoppers on top of the machine chest through which various chemicals are fed automatically in quantities prescribed and in proportion to the speed of the paper machine and the paper made thereon. Bentonite drops into a water mixer from which it passes to a tank where the starch is added and prepared. After mixing, it is then bled into the stock close to the circulating pump. Size and alum are handled both in the pulper and continuously. Dyestuffs are dissolved in water in a predetermined proportion and fed to the stock in liquid form. The procedure of automatic feeding of these ingredients has been followed by other mills for years.

The paper machine is of welded steel construction throughout.

The inlet lip is stably suspended over the wire past the breast roll. The lip may be adjusted as a pressure lip discharging the stock at an angle of about 30 degrees to the wire or it may be adjusted to discharge the stock on a plain level with the charge the stock on a plane level with the wire for different types and weights of paper.

The circulating pump is of a vertical propeller type. The proper nozzle velocity at the inlet lip is obtained and held by varying the speed of the pump for big changes and a bypass valve is used for final regulation. The pump is never choked.

The entire fourdrinier frame, breast roll, couch roll, table rolls, suction boxes, and

white water pan are all suspended permanently from the rear by means of heavy welded steel beams which could not be made of cast iron. A quick wire change may be effected without moving the inlet or any other part of the fourdrinier frame except some filler blocks which are put in for steadying the front of the section during operation.

The Yankee dryers are made of welded steel. This construction allows a double shell arrangement confining the process of condensing steam to an annular chamber of only 2 inches between outer and inner shell. With the double shell construction, the air is removed with the condensate continuously with the result that the first dryer never operates with a steam pressure over 15 pounds at a machine speed of 1,200 feet per minute, and evaporates as high as 20 pounds of water per square foot dryer surface covered per hour, so that the sheet comes off the first dryer at 80% dry. An efficient predrying Yankee dryer of this type may be installed to great advantage on any machine requiring added drying capacity. The first Yankee dryer may also be used for creping. Any grade of paper from the lightest to the heavier grades may be creped here at a predetermined moisture content.

The second Yankee dryer finishes drying the papers made on this machine and takes the place of a number of smaller dryers. This second dryer may give the sheet an M.G. finish on the reverse side if so required or a dull finish may be retained on both sides with the installation of a wet smoothing press in between.

The calender rolls, of which there are only two in the machine shown, are set close to the bedplate. On large stacks, it would be advisable to set the bottom roll low in the same manner. The reel drum is mounted the same. The construction of the slitter and rewind drums is such that they rest directly on the foundation, avoiding all frame work and consequent vibration. There are three motors driving the machine, all d-c. variable speed type. The individual adjustments are with cone pulleys which work well at the higher speeds. Because of the compactness of the layout, no counter or line shafting is required. The 100-hp. motor drives the wet end of the machine when creped paper is made, the 50-hp. motor driving the second dryer, calenders, and reel. On flat papers, the 100 hp. is found sufficient to drive the entire machine with a direct belt hookup for the dry end. A more modern electric drive, but at a higher initial cost, might be found in the use of individual motors.

Since control is the watchword for efficient operation, the dual Yankee machine is equipped with pneumatic loading throughout. The upper couch roll is raised or lowered with the turn of a simple valve. Any pressure may be had on the press rolls and the pressure roll, with individual adjustment for front and back with gauges indicating the exact pressure used. There are three doctors on the first Yankee dryer operated with compressed air, both as to pressure and oscillation. The reel drum is moved with compressed air. These controls contribute to the easy operation of the machine as well as to the precise handling of all adjustments.

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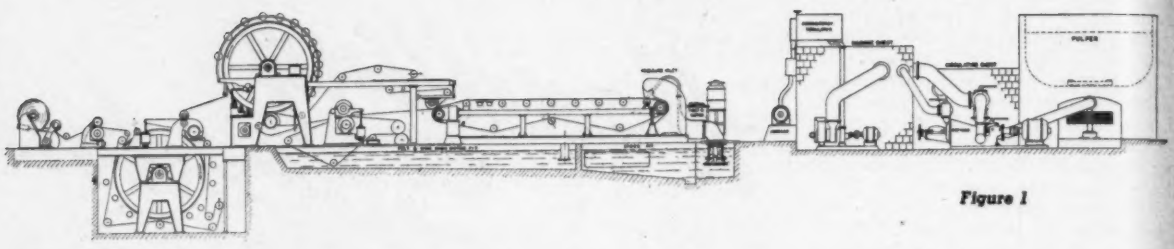

Figure 1

An outstanding feature of the installation of the machine shown is the handling of the felt wash water and the wire shower water. The wet felt passes through a water bath in the pit between the machine. A press squeezes out the surplus water from the felt. The pickup felt is washed with a small stream of water which is being carefully returned to the pit. From there the water is passed to the rear of the machine through a channel at the end of which is a vertical pump lifting the water into a save-all, which acts as a filter and returns any fiber in the water directly into the mixing pit. The amount of fiber thus recovered and returned is in proportion to the stock furnished and does not change the weight of the sheet. The strained water is partly used over again through the showers on the wire. It can be used partly as make-up water in the pulper and for thinning in the stock consistency regulator. The balance of the water may be made ready for final discharge by having it cleared chemically or mechanically, or both.

The compactness of all the functions of the mill described has brought about a change in the manpower setup, inasmuch as a machine tender can be trained and be placed in charge of all operations from stock preparation to finished paper. On the one end there is a laborer furnishing the pulper. One man can do this job on each shift. During the day, a gang with trucks supplies the vicinity of the pulper with raw material, dumping same wherever required. The machine tender sets the refiner, jordans, chemicals, *p*H and all other variables. It is easy to oversee the entire process. Meanwhile, the backtender and helper are kept busy on the reel and rewinder. The mill becomes a four men per shift operation, with a part time upkeep man and a bull gang for receiving and shipping. In addition, of course, there should be a superintendent for proper supervision and training.

The production of steam for drying or power is not given here because of varying local conditions. Nevertheless, it may be added that the steam consumption on a machine as shown and running on lightweight paper is such that steam generated at 150-pound steam pressure may operate a variable speed steam turbine furnishing the power for the paper machine and enough steam over at 25 pound back pressure to dry all the paper. The total power consumption on the mill unit as described is 600 to 650 hp.

An important utilization of the heat in flash steam and condensate is found in air conditioning of the machine room, which has a great deal to do with uniform drying results. On the face of the Yankee dryer an ample supply of heated air is used for complete absorption of the evaporated water from the sheet. The volume of this air is too great to be removed in a closely fitting hood, and it has been found more efficient to arrange for a spacious superstructure above the Yankee dryer into which this air flows of its own accord and at the top of which, it is sucked away by a fan.

The investment in a mill unit as described is lower per ton of paper than in a more complicated mill, because of its compact layout, simple building requirements, and productive efficiency.

Recommendations for streamlining paper mill production cannot be given to cover all needs. Conditions vary too much for that. A great number of improvements for mills of all sorts may be classified and listed.

Stock preparation in most mills is still done batchwise. The beater is not necessary with the use of most pulps and actually disadvantageous for wastepaper. Even today, a good pulper can be built of concrete and with secondhand machine parts. A combination pulper and refiner will be on the market soon. Most jordans are not used to their full capacity. Their work may be doubled in some cases with a pump taking away the stock instead of allowing the jordan to act as a highly inefficient pump and wasting power which otherwise could be used on the fiber. Results from such a hookup are surprising.

Not only now but in a postwar period, the use of deinked and clean wastepaper will be on the increase. This fiber has already been treated, it can be freed up and its addition to the furnish can be beneficial.

On the paper machine, many features tending to make the machine obsolete can be overcome. A modern inlet is a prerequisite for good formation at higher speed. The drive of the machine can be simplified from older antiquated layouts with line shafting, right angle gear reducing units, clutches, etc., with direct electric drives. Suction rolls become necessary as the paper machine speed increases. There are suction couch, suction press, suction extractor and felt suction rolls to be considered. The dual type suction press is an improvement in construction and effectiveness, and is particularly adapted for rebuilding jobs. A new type triple action press with a suction roll will soon be available. Improved water removal can be gained with the replacement of every cast iron body press roll. Such rolls deflect much more than rolls made of forged steel. This necessitates higher crowns so detrimental to rubber covering. Forged steel press rolls do cost more but presses can be operated with much greater pressure, removing more water from the sheet. This increases drying capacity and allows greater production. With the reduced crowns, a more uniform sheet can be made. The increased pressure on press rolls brings up the point of bearings. It is not always easy to replace the old type bronze or babbitt bearing liners, which are definitely limited as to pressure allowances, with modern antifriction bearings requiring special housings, but it is easy on a paper machine to replace every bearing requiring oil and grease and operating under heavy pressure with Micarta or similar plastic material liners which have proven themselves definitely superior in applications suitable for water lubrication. These plastic liners do away with oil and grease so detrimental on a paper machine and at the same time these liners reduce friction, save power, and stay cool.

Welded steel reinforcements can be applied to stiffen any part of the machine frame. Sometimes, the frame work can be eliminated and the machine can be set down as a modern machine should be. Pneu-

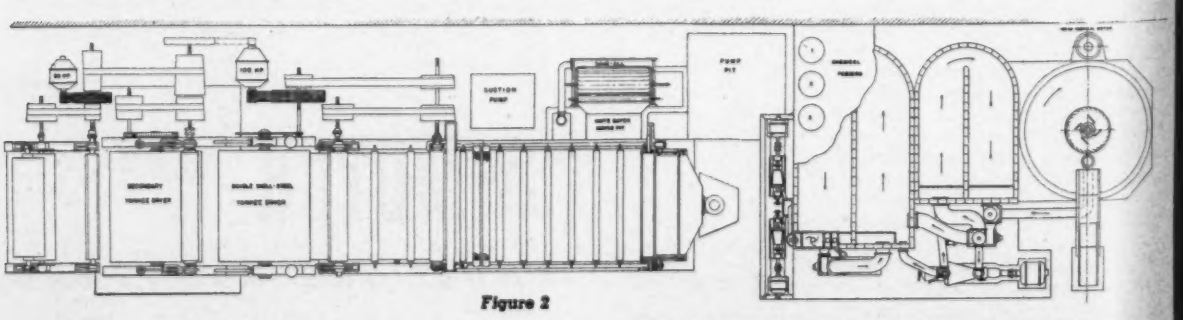

Figure 2

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matic controls to take the place of levers and weights on presses, stock control, water control, variable speed, in fact automatic control of everything becomes more essential for higher production.

The dryer section is, on most paper machines, the greatest bottleneck and source of trouble. There is a solution for efficient drying of paper but it has not as yet been widely recognized and adopted. That solution lies in the use of the Yankee dryer principle. Basically, a square foot of Yankee dryer surface will dry as high as ten times as much as one square foot of ordinary dryer surface because the paper is made to adhere to the bare dryer surface eliminating the air space between sheet and dryer. The general introduction and use of the Yankee dryer has been limited due to lack of interest and conservatism on the part of the papermaker. No mills could be found to risk the installation of a Yankee dryer for more general purposes than heretofore accepted. Yet, in the modern manufacture of toilet paper, for instance, a Yankee dryer has become essential. That use came from experience gained in the making of cellulose wadding and facial tissue which has to be dried altogether on one dryer. Wadding machines operate now at 2,000 fpm. Before that, Yankee dryers were only used on M.G. papers. It is claimed here that a broad variety of papers in a large range of weights can actually be made on a machine equipped with one or more Yankee dryers. The gloss of the M.G. papers will not occur if the paper is taken off the dryer surface before it is completely dry.

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The older paper machines present the best opportunity for a real comeback in production with the total elimination of their antiquated dryer sections and their replacement with one or more Yankee dryers for a wide field of papers including printing, wrapping, bag, tissue, and many others. There is a hookup for any of these papers as well as an application for part drying of heavy papers and board. It might well be that the streamlining of older machines with the simple Yankee principle will lead the industry to improved and faster methods of making paper.

Controlled Hydraulics on Flat Screens for Improved Pulp Production and Quality

H. F. SCHENK, Service Engineer
W. A. Hardy & Sons Co.

It is agreed that if the slotted areas of screen plates are open and stay open, good capacities of clean pulp are obtained, but if the slotted areas are constantly plugging there is constantly diminishing fiber quantity and quality. Strains on plates, plate holders, diaphragms, and drives are increased and men must be constantly at work with high pressure steam and water hoses in an effort to keep the slots open.

The question of what to do about it is still prevalent although nature has given water a number of hydraulic habits as old as time itself. The main troubles can be traced to the fact that the study of these properties has been neglected and water has been taken for granted.

It will be found that the hydraulic properties of water are at work, providing the influencing factors in the field of flow separation, both over and under the slotted area of a screen plate. When the scope of each of these factors is found and the dimensions of their forces determined, they then can be combined to give far more flexible and greater control of the equipment for handling the fiber variables met in making any particular kind of pulp.

To consistently maintain an uninterrupted flow of water and fiber through the slotted area in a velocity or flow field, a study must be made to determine the correct relationship between the length and rate of pulsating strokes, number and width of the bars between the slots, size of the slots, the weight and velocity in the hydraulic gradient over a given slotted area. These mechanical relationships of the screen and plates can be combined with the influencing hydraulic properties on bodies of fiber in suspension in water. When both are properly combined, the flexible controlling factors required to do the kind of a screening job but not always attained are possessed.

The floor of the field of flow separation in a screen is composed of many rectangular orifices, spaced usually from $\frac{1}{8}$ to $\frac{1}{4}$ inch apart and from 0.006 up to about 0.030 inch wide with the direction of these orifices usually parallel with the flow over the surfaces of the plates.

It is definitely known that when fiber is present in a mass of liquid particles that are flowing through many small orifices in the floor of a flume (a screen line with the diaphragm lifting mechanism temporarily disconnected) that the full force of their large stagnant area composed of the many small stagnant areas around the slotted orifices quickly becomes the predominating force to block out all the gravitational force, even on the water particles. The fibers being caught in the stagnant 90 degree bending area cannot make the bend and become lodged across the slots.

Plates with eight slots per inch will block completely in much less time than plates will with four slots per inch with the same size rectangular orifice in each. This is directly due to the fact that the total stagnant area surrounding the four slots to inch drainage area is much less than the total stagnant area surrounding the eight slots to the inch drainage area. There are also many more radial flow paths in a plate with eight slots per inch than in one with fewer slots. The nearness of so many neighboring flow paths creates an abnormal number of counteracting flow forces which help to increase the adverse effect of the sum total of all the stagnant areas.

Much can be learned about the habits of fluid particles in motion and fiber in motion in the field of flow separation around a number of rectangular orifices at various spacings simply by permitting a small trickle of water and fiber to flow slowly onto the screen plates, when the diaphragm lifting mechanism is disconnected. The results of such an observation will aid materially in helping one to understand the conflicting natural forces at work on these two very dis-similar materials.

The main function of the force directed upward through the screen plate slots by the upward motion of the diaphragm is to dislodge fiber caught in the stagnant areas surrounding the edges of the orifices; fiber which is dimensional to such an extent that its length is many times its diameter or its cross-section area. That one fiber or bundles of fibers is surrounded by millions of water particles of molecular dimension.

The up and down stroke of the diaphragm is of various distances ranging from $\frac{1}{32}$ to $\frac{3}{8}$ inch with the average lengths around $\frac{1}{16}$ inch.

If the screen vat is of such a type that it does not have a drop-leg in the outlet, it must be operated by lifting a diaphragm chamber completely full of water against the underside of the plates to create a sufficient force up through the slots to dislodge the fiber that becomes trapped in the stagnant areas surrounding each rectangular orifice or slot. The material in this jet forced up through the slots is hard incompressible water. This water jet is forced upward through the slots, to nearly the full distance to stroke travel above the surface of the plate.

This harsh upsurging jet of water creates a violent disturbance to the already turbulent area in the field of flow separation which is naturally turbulent, due to the bending of the stream and the viscous shear taking place on the surface of the screen plate where the turbulent strata tears itself from the laminar streamlined strata above it. These are very damaging forces, wherever they are found. No

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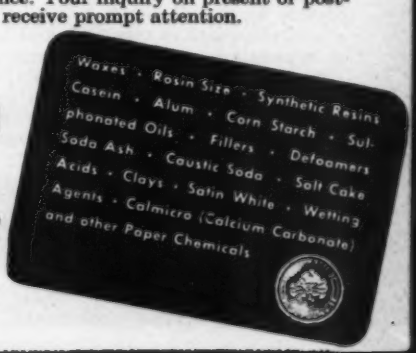
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thought has been applied to better control and to better utilize the forces at work at this point by properly proportioning the width of the bar between the slot, the width of the slot, the direction of the slot to the flow, the length of the lift of the diaphragm, the frequency of this lift, and other mechanical factors.

Very little can be done to improve the control of the influence of the hydraulic and mechanical forces at work on a screen built without an adequate drop-leg.

When the rectangular orifices or slots are too closely spaced, there are too many multiples of gravitational forces directed in a limited area through which the countless water particles can crowd and prematurely leave the fiber particles. Because of their length and cross section the fibers are hindered by the flow retarding forces which surround every orifice. The excess numbers of stagnant areas of lost flow forces creates a set of flow resisting forces to the fiber far in excess to those that can be controlled to help the flow of the fiber through the slots.

In a five slot to the inch plate, there are 2,984 linear inches of 90 degrees slot edge compared with 4,756 inches of flow bending corners in the 8-slot plate. As the total length of the liquid shearing forces in a plate is decreased control is gained over more forces acting on the fluid particles and the use of these forces can be made in the directional control of the fibers without the excessive runoff of water particles.

With 1,492 linear inches of orifice opening in the 5-slot plate as compared with 2,378 linear inches of orifice opening in the 8-slot plate, the turbulent disturbance in the field of flow separation directly over the slotted area will be much less and consequently much more beneficial if one can utilize air pressure for the blowback jet rather than a hard incompressible water jet.

The compression forces of air in the upstroke of the diaphragm meeting the gravity pressures of water directly over the slotted orifices are crowded off into the sides of the flow field surrounding the rectangular orifices, because the gravity forces are greater than the flow forces in the stagnant radial flow paths. The action of this air pressure through the stagnant radial flow paths is such as to dislodge fiber particles from the stagnant area adjoining the edges of the slot. However, the dislodged fiber meets other radial pressure forces bearing other dislodged fiber from the adjoining stagnant area bordering the next adjacent slot. The stream lines of force meet at a point above the center of the bar separating adjoining orifices or slots where they start to rise. They cannot go down so they go up to meet and join the forces of viscous shear being dominated by the gravitational forces that are directing the flow of the liquid and fiber particles down through the orifices or slots. The width of the bar between the slots then governs or adjusts the angle of liquid shear to the point where it is not excessively sharp and guides the fiber into and through the slots.

If the blowback jets are composed of water, it is knifelike in shape since water at 100 Fahr. is about 36 times as viscous as air. At 600 throws a minute, its life is only 1/10 of a second and it is known that a hard sharp stream of water cannot be bent quickly or easily in such a short duration of time. Consequently this hard narrow jet of water is projected straight up through the orifice against the gravitational forces trying to get down through the orifice. Because this jet of water possesses so much more viscosity and hardness than air, it resists the liquid shear and does not bend the 90 degree angle around the edge (of the rectilinear orifice) to act as a disturbing medium to the fiber that has lodged in the stagnant area surrounding each orifice.

The gravitational force over the orifice being greater than that over the bars between the orifices, the water jet when bent over the orifice follows the lines of least resistance which are the gravitational pressure lines. These are already bearing down on the stagnant areas on the bars between the slots, thereby the forces that are binding the lodged fibers are augmented causing the need of more and vigorous hosing.

Effect of Moisture on the Physical Properties of Paper Base Plastics

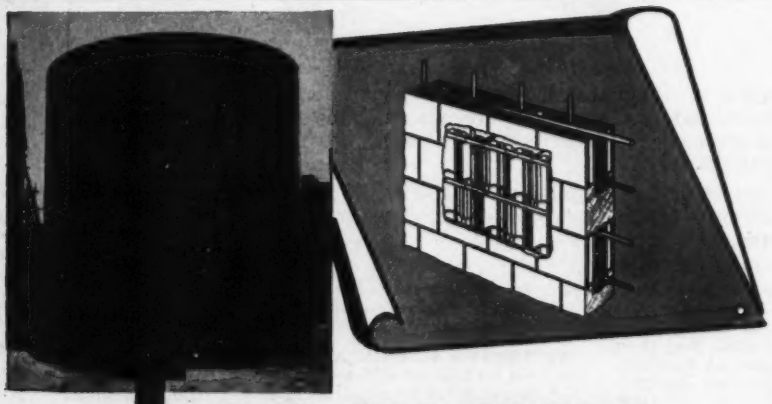
A. H. CROUP, Physicist
Hammermill Paper Company

During the course of certain investigations on the adaptability and application of sulphite papers for laminating purposes, it has been found that the moisture content of the impregnated paper plays as important a part in the physical properties of the laminated plastic as does the moisture content of the plastic itself. Although paper has been used for years as a base in certain laminated products, little attention appears to have been paid to the effect of the moisture content in the impregnated sheet. There is practically no literature on the subject and none of the standard testing methods for paper base plastics, as A.S.T.M. Specifications, Federal Specifications for Organic Plastics, LP-406, or Bureau of Ships *ad interim* Specifications for Laminated Phenolic Material, refer to any humidity, conditioning period for the paper, although conditioning requirements are specified for testing all types of plastic materials.

The moisture content of the impregnated paper appears to have little effect on the water absorption and the dimensional stability (change in dimensions due to water absorption) of the laminate up to about 4% moisture (approximately 50% R. H.), but as the moisture content increases above this value the material begins to absorb greater amounts of water with a consequent increase in swelling.

Neither the abrasive resistance nor the specific gravity of the laminate appear to be affected by the moisture content of the impregnated paper.

The ultimate tensile strength, the modulus of rupture (flexure) and the moduli of elasticity in tensile and in flexure of



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the laminate appear to decrease lineally as the moisture content of the impregnated sheet increases. Assuming that these curves are linear, the extrapolated values at the extreme conditions of 0% moisture (0% relative humidity) and 8% moisture (about 95% relative humidity) show that the ultimate tensile strengths are about 34,500 psi and 22,000 psi respectively. Thus, a change from 0 to 100% relative humidity has produced about a 34% decrease in the tensile strength. Similarly, there is about a 46% decrease in the flexural strength from 0 to 100% relative humidity. The moduli show similar decreases. These, of course, are extreme limits not too likely to be encountered in commercial practice. In general, the strengths of the laminate vary by from 4% to 6% for each unit change in the per cent moisture content of the impregnated sheet.

The impact strength of the laminate is the only physical property of those investigated that shows an improvement with an increase in the moisture content. However, the material even at 100% relative humidity is still too brittle to warrant any recommendation that the impact strength of paper base laminated plastics can be improved by increasing the moisture content of the impregnated sheet at the expense of the other physical properties.

Preliminary investigations have shown that the moisture content of the laminated plastic has a profound influence on its strength properties.

Of those properties investigated, impact is the only property which corresponds in its general character to that obtained in the preceding case. The tensile strength curve shows a maximum of about 50% R. H. (although there appears to be little change in strength between about 35% R. H. and 65% R. H.) and decreases at the lower and higher humidities. Abrasive resistance shows little variation with absorbed moisture up to about 50 to 60% relative humidity and then the resistance rapidly decreases as is shown by the rise in the loss in weight.

Since moisture in the impregnated sheet produces one effect on the strength properties and moisture in the laminated plastic produces another effect, it would be a reasonable assumption that the ultimate physical property of the laminate would be the result of the moisture effect of the one superposed on the moisture effect of the other. The exact nature of this combined effect remains to be investigated.

It is fully realized that other mechanical strengths, as compression and shear, are probably more important in structural work than tensile and flexural strengths but time and equipment have not permitted these tests to be carried out. Other lines of investigation might be: (1) the moisture effect on the strength properties of other base materials as kraft, rag and alpha papers, cloth and canvas, asbestos and wood flour, and even glass fibers; (2) the moisture effect when the various resins—phenolic, melamine, ureas, lignin, etc.—are used with different fillers, and; (3) the moisture effect on the electrical properties of those fillers and resins most commonly used for electrical insulations.

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Substitutes for Round Pine Wood in Making Alkaline Pulps

EDWARD H. HILL, Technical Director
North Carolina Pulp Co.

During the past year, it has been necessary in some mills to curtail production or close for a part of the week because of a wood shortage. Practically every mill in the South has been affected in some way by this problem.

The object of this paper is to present some of the outstanding data accumulated from a study made in an attempt to run the Plymouth mill full time. It is realized that the data presented here may not duplicate results found by other investigators since there are many factors to be considered in comparing experimental data. It is believed, however, that the data present will check results from investigations made under similar conditions.

Five substitutes for round pine logs (1. New Jersey scrub pine, 2. Pine slabs, 3. Chip screen rejects, 4. Sawmill sawdust, 5, Navy yard shavings, 6. Regular mill pine logs) were investigated.

The logs used for comparison were taken from the mill supply of pine. Enough logs were chipped under mill conditions for the experimental cooks. Slabs and New Jersey round wood were chipped under the same conditions. The mechanical separation of the different sizes of the cooked materials were made by following the procedure set up by the Williams Apparatus Co.

There were several large piles of sawdust of different ages available. To determine if the age of the material affected the yield and strength characteristics, cooks were made from material that was new, 3, and 12 years old.

The first trouble from the cooking of chip screen rejects was in charging the digester and getting it to blow clean. Also, it was not possible to get as much liquor in the digester when sawdust was being cooked as when cooking chips.

Several days after starting to cook sawdust, small particles of sand were found in the bleached pulp. At Plymouth, two types of pulp are produced: (1) a well cooked pulp which is used for bleaching purposes and (2) one that is cooked much harder which is used for box board, etc. Sawdust was being cooked on the box board pulp side and laboratory tests showed that there was considerable sand in both the chip screen rejects and the sawmill sawdust. In the black liquor washing system, the same storage tanks are used for the washers on the soft pulp side as on the hard pulp side. By investigation it was found that sand was getting into the bleached pulp through the washing system from the chip screen rejects and sawdust. This trouble was eliminated by building baffles over the pump intakes for the washers from the black liquor storage tanks.

At the present time investigations are being made of the screening of the chip screen rejects and sawmill sawdust through a fine mesh screen in the mill as a means of eliminating most of the sand. So far these tests have shown that by discharging 10% of these materials, the sand content will be decreased from 80 to 90%.

It is believed, however, that the following points should be brought out and are justifiable as based on tests made under the conditions employed in this report.

1. Pine slabs showed 911 pounds less moisture-free weight per unit of 160 cubic feet than the regular pine logs. The chip screen rejects and sawmill sawdust showed 1,223 pounds and 1,205 pounds less moisture-free weight per unit of 160 cubic feet.

2. The pine slab wood showed higher caustic solubility tests than the pine logs, the chip screen rejects, or the sawmill sawdust.

3. In cooking sawmill sawdust of different ages, it was found that the per cent air dry yield based on moisture-free sawdust dropped in proportion to the age of the sawdust.

4. The per cent air dry yield on moisture-free material charged into the digester was 51.2% for the regular mill logs, 48.6% for the pine slabs, 45.2% for the chip screen rejects, and 45.0% for the sawmill sawdust.

5. The yield of air dry pulp per 160 cubic feet unit was 1,492 pounds for the regular mill logs, 1,069 pounds for the New Jersey scrub pine, 950 pounds for the unpeeled pine slabs, 747 pounds for the chip screen rejects, 731 pounds for the sawmill sawdust, and 356 pounds for the Navy yard shavings.

6. In general the strength characteristics of the pulp made from the New Jersey scrub pine were about the same as those of the pulp made from the regular pine wood, that made from slabs was about 8% lower, that made from chip screen rejects was about 14% lower, that made from sawmill sawdust was about 40% lower, and that made from Navy yard shavings was about 17% lower.

7. The cost of enough wood to produce a ton of pulp from the different materials investigated was $17.55 for the regular pine logs, $28.05 for the New Jersey scrub pine, $20.90 for the pine slabs, $4.69 for the chip screen rejects, $10.24 for the sawmill sawdust, and $17.89 for the Navy yard shavings.

8. Based on a capacity of 400 tons of pulp per day, there would be added in the mill system without any washing, 1,720 pounds of sand from the use of pine slabs, 4,200 pounds from the use of chip screen rejects, 1,800 pounds from sawmill sawdust, and 32 pounds from Navy yard shavings.

9. In general, there is a large saving from using chip screen rejects or sawmill sawdust in place of regular pine logs. However, the hidden cost, and inferior quality pulps should be considered before definitely deciding to use this type of raw material. It is believed that with proper screening facilities, the chip screen rejects that are ordinarily thrown away can be used at a considerable saving to replace a part of the pine logs necessary in making a ton of pulp. It is recommended that all mills thoroughly investigate their raw material possibilities before definitely deciding to use any of the substitutes that have been studied for this report.

This is the third installment of abridgments of papers presented at the annual meeting of The American Pulp and Paper Mill Superintendents Association, held in Chicago, May 24-26, 1944. More of these abridgments will appear in future issues.

Slices and Methods of Improving Fourdrinier Sheet Formation

J. E. GOODWILLIE
Beloit Iron Works

Let us consider four main requirements for sheet formation: first, a clear formation reasonably free of clots or small clouds; second, absence of streaks or other large faults; third, well developed strength both with and across machine direction; and fourth, a minimum of two-sidedness.

There is a distinct possibility that the small clots or clouds that often spoil the look-through of an otherwise good sheet may have been formed on the wire and after the flow left the slice lip. On the assumption that an improvement could be otherwise accomplished, steps have been taken to eliminate this type of imperfection by the use of more water, by changes in the head box to produce more life or agitation in the flow right up to the slice, introduction of rectifier rolls close to the

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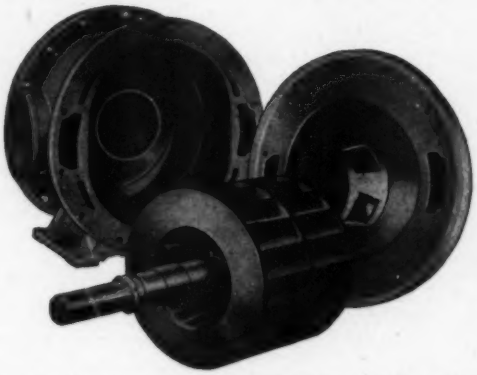

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slice, or greatly increasing the speed of rectifier roll rotation. In one instance and as an experiment, particularly violent agitation was produced just behind the slice, but the clots still persisted. In other words, in spite of efforts that probably resulted in fiber bundles being broken up and floated apart at the slice, in these instances they still formed on the wire. Since the same type of clot formation has been observed in light weight sheets run at high machine speeds and heavier sheets run at much lower speeds, it cannot be a matter of time on the wire permitting clot formation in the pool carried on the wire. These thoughts have led to a belief that water forced back up through the wire is often the cause of this difficulty. In support of this conclusion, we might consider that slow stocks, generally speaking, are far less prone to clot, probably because the rate of drainage through the wire is less with the slower stocks and less water is caught in the nip between table roll and wire, to be forced up through the forming sheet. The slower machine speeds usually prevailing with slower sheets is another step in the same direction.

If water forced back through the wire by table rolls causes clots by floating small pieces of the first mat of fibers forming on the wire out of their rightful positions, the remedy would be to prevent water passing in large quantities into the nip between wire and table roll. The first section of rolls after the slice is, of course, the logical seat of the trouble, because the drainage is greatest here and the sheet not yet strong enough to hold together. A good forming board will permit some drainage and get rid of much of the first rush through the wire, and at the same time does not force water up to impair sheet formation. Properly arranged deflectors placed at the oncoming side of each table roll in the first section of table will unload the underside of the wire and get the water safely down into the saveall. Borrowing an idea from tissue machines, a judicious use of dandy type, or open faced table rolls, might be helpful. Although they do not have the water removing capacity of plain table rolls and therefore permit the water to carry farther down the table, dandy type rolls will not force water through the wire.

Poorly balanced table rolls or return wire rolls can cause wire vibration harmful to the formation, and it has sometimes been considered that vibrations from outside sources, such as screens or vacuum pumps, has had the same effect.

Most streaks originate back at the slice and head box, but the fourdrinier table is responsible for some. The edge condition is the outstanding example and, barring some particularly bad head box situation, is usually a mattter of type or setting of deckles. Subject to objection from those who believe otherwise, the no-deckle device, or deckle ruler, has given very good results when properly applied. At the slice end, it should be arranged to take the flow from the slice lip without creating any disturbance, and then gradually opened out to a greater width across the wire at the suction box end, thus compensating for the tendency of the shake to create an edge wave. Best results are obtained by keeping the deckles as short as possible.

Streaks also originate at forming boards, deflectors and suction boxes. Nicked or badly rounded edges can have the effect of passing water along with the wire in streaks, instead of skimming it off uniformly, and thus cause streaks to develop in the finished sheet. It is well known that a streaked condition can be formed at the first suction box, with some types of stock, unless a greatly reduced vacuum is maintained. Quite general use in these instances is made of the strip, or complete cross slot cover, but in less extreme cases it is sufficient to cut a groove in the face of the cover just ahead of, and connecting with the leading edges of the holes or slots.

The fourdrinier table must be long enough and adequately equipped so that sufficient water can be introduced with the stock, and removed, to build a good sheet.

The condition of the returning wire as it comes to the breast roll may affect two-sidedness. Save-alls or breast roll doctors that permit streaks of white water to run on the return wire may cause galvanizing on the bottom surface of the sheet. Uneven shower action is also a cause of trouble. In some instances a well balanced, freely turning roll brought into light contact with the outside surface of the wire just before it passes to the breast roll has been very helpful in removing water from the meshes of the wire, thus minimizing galvanized conditions.

The stock and water mixture should be brought to the wire uniformly across its width at a speed, under control of the operator, closely approaching that of the wire.

Out-of-true conditions of flow, which we can simply call cross currents, are the principal cause of streaks in formation. They are responsible for weight variations across the sheet, adversely affect test and finish, promote galvanizing or two-sidedness, and on lighter weight papers cause loss in production because of breaks. They tend to be anything but constant, shifting from point to point and causing the well-known play of wet streaks at the suction boxes.

Actually the problem of bringing stock and water to the wire under favorable conditions is not so much a matter of type and arrangement of the slice as it is the effectiveness of the head box and its source of supply.

In recent years, several new types of distributors have been brought forward and these are now operating in a number of paper machines. Most of these distributors discharge from a nozzle the full width of the slice into comparatively small open head boxes. A principal function of the small head box is to permit release of air which has worked out of the flow in its passage through the connecting piping and distributor.

As many machines will be operating with more or less conventional head boxes for some time to come, perhaps some general notes on conditions encountered in flow control my be helpful.

The first point for mention is that spouting of high velocity streams into head boxes is bad practice, as they are most difficult to dampen out and very likely to promote cross currents with the resulting streaked flo on the wire. With screens located high to take care of maximum speed conditions, we sometimes find heavy cascades of water falling into the head box with violent swirls and boils partially controlled by pinching down on adjustable baffles located at several points in the box. Better operation will result if the necessary reduction in head from screen flow box level is accomplished as close to the screens as possible and without any open waterfall. This should result in eliminating the necessity of any throttling close to the slice.

Another condition needing attention arises from the fact that water does not behave well when forced to turn a corner. Unless conditions at the turn are favorable, the flow will not follow the walls of the passage smoothly, but eddies and swirls

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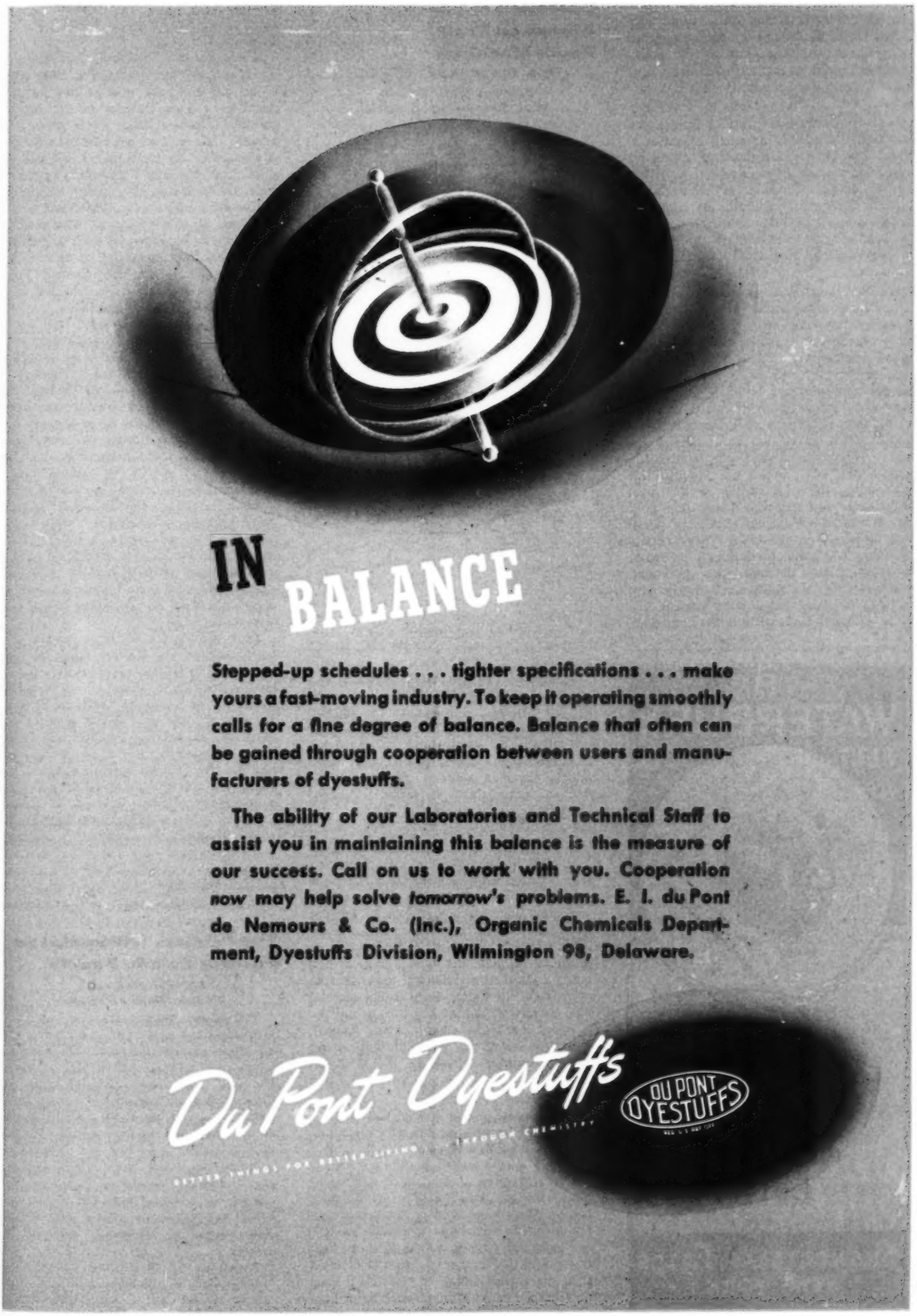
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will be formed. Generally speaking, a head box should have as few turns, baffles and passes as possible, and by taking steps to bring the flow into the box in a smoother and more uniform manner, it is often possible to considerably simplify the arrangement.

The use of rectifier rolls in head boxes has been the subject of much controversy. From actual experience, however, these rolls can often be used to good advantage. They can be constructed so as to avoid formation of strings in practically all grades of stock, to keep clean over reasonably long periods of time, and to be very effective in reducing bad flow conditions and cross currents.

In the tissue field and for other high speed operations, recent years have seen growing use made of a slice arangement very old on fine paper machines. In high speed operation, we speak of pressure formation, but on fine paper machines they simply said they carried their slice down the wire. At any rate, the effect was and is to allow some drainage through the wire under the head of the pond behind the slice. This arrangement is generally useful, particularly when means are provided for positioning the slice readily to the exact location to suit the sheet being run, as it has the effect of quickly setting an initial mat of fibers on the wire. This prepares the way for gradually building the sheet as it passes over the fourdrinier table with the result that the formation is not as vulnerable to disturbances from beneath the wire, as mentioned earlier in the discussion.

Operation of Vacuum Pumps on Kraft Paper Machines

C. L. CLARK and C. VICARIO
Pulp and Paper Division
Nash Engineering Company

The function of vacuum pumps on a paper machine is to remove water from the sheet and to dry it up as much as possible before it goes to the dryer section.

A far greater rate of water removal must take place at the flat boxes and at the couch as production is increased. This is particularly true of present high speed kraft paper and board machines on which the stock consistency approaching the first flat box has been observed as low as 1½%. Ten or twelve years ago 2½ to 4% was a reasonable range.

To take care of this large amount of water, which may be as much as 5,000 gallons per minute on a wide machine producing 400 to 500 tons of kraft liner in 24 hours, very wide and deep flat boxes are needed. The connections from the boxes, the separator piping and the drop legs have to be much larger than ever before. A larger vacuum pump and the resulting higher vacuum is of little help if the number of boxes is not great enough and the size of boxes and the piping is too small. The higher vacuum, which might be produced, consumes more power, but has little effect on water removal if boxes and piping are inadequate to handle the quantity of water. Present practice on high production kraft machine involves as many as ten, twelve inch wide deep boxes, each with a ten inch connection. On older machines, which have been speeded up, two or three large boxes have been substituted for the same number of smaller ones located nearest the head box where the quantity of water is greatest. By increasing box and pipe sizes, the extra water can be handled without an increase in vacuum. The pump is often relatively smaller per ton of paper produced than was the case some years ago.

Needless to say, vacuum must be kept as low as possible on the wire boxes to relieve wear. We hear occasionally of kraft machines, which are carrying ten, twelve and even eighteen inches vacuum on flat box headers. This merely means that pipes or boxes are too small. The vacuum is measured beyond the boxes, and in the boxes themselves especially at the front side away from the outlet, the vacuum may be only an inch or two of mercury. It will be apparent that when a box becomes flooded, water removal at the back side will be retarded, resulting in uneven drying across the sheet, and high vacuum in the flat box header means nothing.

Let us assume that a sufficient number and size of boxes with adequate separators and drop legs have been provided, so that the water can get away smoothly with about five to six inches of vacuum at each separator. We can then apply a low vacuum type of Nash Pump with a consequent saving in power. The type is known as "K" and consumes from twenty to thirty percent less power per cubic foot of air handled than the corresponding "L" standard cone type Nash Pump. A wide machine making liner at high speed will operate satisfactorily with from 75 hp. to 100 hp. for ten large boxes.

When the paper leaves the last flat box, the consistency has increased to from eight to ten per cent, and it must now be subjected to a high vacuum on the suction couch to obtain as much water removal as possible. There is no wear on the wire due to vacuum at the couch as the roll and the wire turn together. Therefore, vacuums close to 20 inches of mercury should be sought for maximum water removal and a minimum of wire slippage. The sheet is drying up, and it is harder work to pull the water away from the fibers, so more pump capacity and more power are needed. Years ago, suction couches were provided with suction boxes 7 or 8 inches wide; i.e., the distance between packing strips was 7 to 8 inches. As speeds and tonnages increased, boxes in couch rolls, on kraft machines particularly, were increased to about 14 inches in width. This nearly doubled the time under vacuum and allowed more water to be removed. Vacuum pump capacity had to be increased to handle the extra area. A wide machine making top production will require 300 to 400 hp. in vacuum pumps on its suction couch to do the job properly.

More recently, the so-called primary couch has been introduced in a large southern mill. This primary couch located ahead of the main couch gives additional suction area for water removal without increasing wear on the wire, reducing the necessity of high vacuum on the dry boxes to get very high tonnage.

After passing into the press section of a kraft machine, the sheet is quite dry and little or no additional water can be removed by air infiltration alone. Now water is forced out by mechanical pressure in passing through the nips rather than by the effect of air passing through the paper. The mechanical pressure squeezes the water into the felt, and the vacuum removes this water from the felt and keeps the felt open. A vacuum of from eighteen to twenty inches of mercury is desirable and can be produced with the expenditure of one hundred horsepower per press on a wide machine. Two suction presses are still most common, although three have been used with good results on one or two machines.

The Printers' Viewpoint on Postwar Coated Papers

ARNOLD McANENY
Bradner, Smith & Company

The printer himself is chiefly interested in trouble free paper. It is his job to get the sheet through the press and deliver a satisfactory looking job to his customer. He isn't necessarily concerned with the basis weight of the stock so long as it possesses enough strength to hold together on his press and enough stiffness to give him no trouble in feeding. He is, however, *definitely* interested in its press performance and in this connection let me mention one of the foremost and still almost universal complaints on coated papers, machine coated or otherwise, and that is, picking.

Remember that all a printer can do when he encounters this problem is to reduce the tack of his ink, which results in a washed

out looking job, or slow down his press which means lost production. And remember also that the public will demand more and more color in their printing after the war. Four color wet printing will increase. This means tackier inks for successful trapping. As yet, we don't know in detail about new developments in postwar printing machinery, but it is safe to assume that press speeds will be greater. The use of plastic plates, for example, will lessen the load that a press has to carry and thereby increase its speed. This will cause an extra pull on the sheet.

Another very important point the printers stress is uniformity of coating. If the coating is not uniform, if it is thicker in one spot than in another, the vehicle of the ink will penetrate to a greater extent in that portion. This will leave the unprotected, unbound pigment loose on the surface, which may then readily chalk off.

Up until now, no machine coated papers have appeared on the market suitable for offset. No starch seems to be sufficiently immune to the effects of water on the press to offer a trouble-free sheet in this respect. Some printers object to the color of such sheets. Others claim you cannot carry enough coating to make the sheet satisfactorily opaque.

In letterpress, the present day starches are not very successful, as they have a tendency to harden. A hard sheet is a poor printing sheet, it lacks the resiliency to lift the ink cleanly off the form or to take a uniform impression. Some way should be found to make the coating heavier, but not so brittle as to crack, particularly in gravure, where the cylinder may very easily become scratched.

Fortunately the prejudice among large consumers against groundwood is breaking down. It is cheap and prints well. Can you make a high grade coated sheet with less glare? Such a sheet is more in demand than you may realize, both by printer and consumer.

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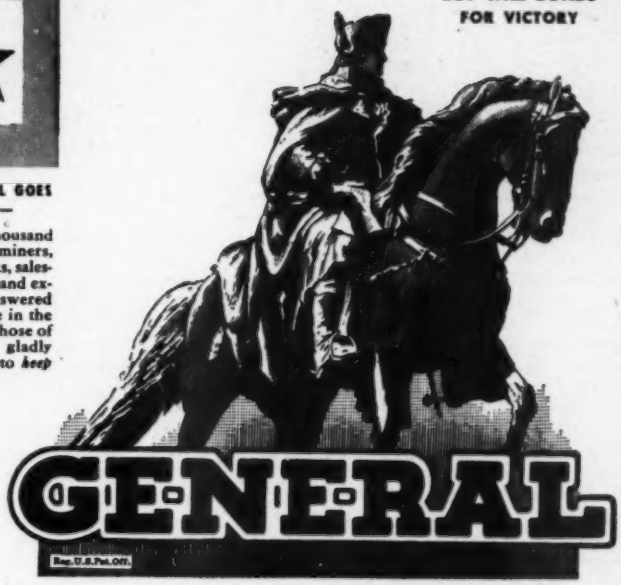

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should be taken across the face being placed in the stack.

When placed in the stack for the first time, its direction of rotation should be noted and the roll so marked to assure its being rotated throughout its life in the same direction. This rotation is also carried through when the roll is removed for turning in the lathe and grinding after being pulled for reconditioning.

Roll checking is the fear of all supercalender men, for the checks point to early removal from service. The harder the roll, the worse the checking is when checking develops. The danger in making a roll softer to avoid checking is the constant threat the roll may go to pieces under heavy nip pressure. For any constant nip pressure, the near the roll hardness is to the ideal for that nip pressure, the less tendency there will be to check.

Regardless of the density required on any cotton roll application, a roll without resiliency is useless for all practical purposes. As speed and pressure increase, the temperature in the roll rises. The roll under this increase in temperature tends to soften. This explains in part why the density of a roll should be made for the highest pressure and temperature that has to be encountered and also explains why a roll thus made will not finish or cover as well when used below the maximum required.

Rolls check more frequently on stacks having high nip pressure on plain bearing stacks, also on too dry papers, and also in mills that skimp on conditioning the roll surface.

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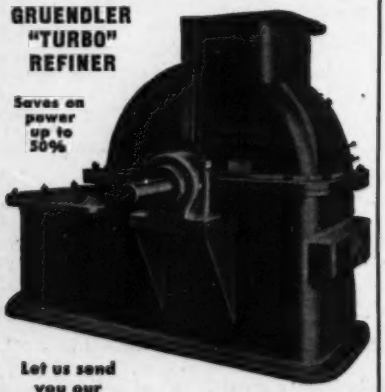

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***Builders of* WOOD-HOGS, STRAW and WASTE PAPER SHREDDERS**

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Rolls should be installed with their protective paper wrapping to preclude any oil or grease coming in contact with them.

As is well known, all rolls in the stack, except the bottom roll, revolve by friction. The drive being on the bottom roll, all rolls above are really gears with invisible teeth. This places a terrific strain on a green roll unless precautions are taken to fuse a crust on the immediate outer surface to withstand the friction necessary to drive the roll above it. However smooth a roll is ground, a strong glass discloses many porous irregularities in the surface that must be sealed to assure satisfactory service and long life. To achieve this result, the roll should be rotated slowly with a minimum of steady pressure applied preferably through the turnbuckle rather than the weight levers, and water applied sparingly. As the temperature increases, enough water should be added at stated intervals to insure their not being unduly overheated too quickly.

At this point trained observation, based on past experience, is of the utmost value, for at this stage the life of the roll can be materially shortened as well as its probable premature removal from service for reconditioning if the process is unduly hastened. The roll, while in the process of breaking in, should never become uncomfortably hot to the bare hand until such time as the roll is thoroughly broken in and allowed to assume its normal running temperature.

During this period, varying with the individual, pressure has been increased very gradually and the roll sponged more often as the temperature increased until such time, based on experience, the operator feels the roll is ready for service. The roll has by this time absorbed much water. Allow the roll to run until it is perfectly dry and then follow through by observing these few don'ts:

Don't overwork your stack by running too dry a sheet.

Don't wash down a hot roll with cold water.

Don't ever jog or inch a stack with the weights on.

Don't allow too much surging on the bottom weight levers.

Don't abruptly shut down and go away over the week-end leaving hot rolls exposed to cold air from any open windows.

The drier the paper being run means working the cotton rolls that much harder. The crust on the roll chars and the checking starts immediately beneath. When a cotton roll is removed from service and refinished only by grinding to true up the surface, it comes back into service with incipient checks already in the surface. In order to eliminate this hazard, the roll should be turned in the lathe, the entire crust removed and a final slow, fine feed taken across its entire surface. The fiber coming from the roll at this point should be closely observed and any breaks or kinks should be studied with a view to the possibility of a further cut being made if necessary. When once a white, unbroken thread is coming from the cutting tool, all traces of checking have been removed. The importance of this cannot be too highly emphasized.

In this respect, it might be said that check marks have been about 90% eliminated by the installation of antifriction bearings.

By fusing a proper crust on the immediate outer circumference, one is insured of setting up a good barrier against check marks. A roll properly broken in before paper is allowed to run through the nip will never check unless too scant attention has been paid to the proper moisture content in the sheet, or to a poorly calipered sheet that requires the touching up of the rolls by the operator, thereby uncovering the spot touched up to the ravages of heat and also taking away the finish at this spot.

If shutting down production to sand all rolls is looked upon as necessary—and it is necessary once sanding is accepted as standard practice—then all rolls should be withdrawn from service and properly reconditioned as previously mentioned before being returned to service. At best, sanding should be only employed as an emergency measure and to keep the ends of the filling outside the path of the paper from becoming high.

Outline for Analysis of a Facial Tissue Machine

ALLEN A. LOWE, Field Engineer
The Sandy Hill Iron and Brass Works

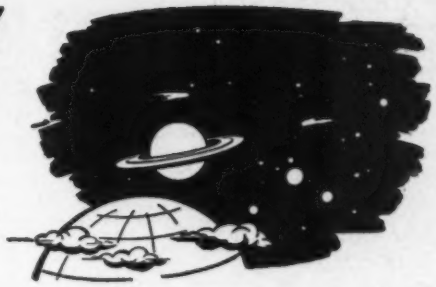
Facial tissue is made on both fourdrinier and cylinder machines. I cannot say which came first—cylinder or fourdrinier tissue. By analogy from the toilet tissue field, it is probable that the cylinder machine came first. There are a number of cylinder machines in operation. Several of them make a very good grade of product. From the point of view of their operating and sales organizations, their economics are sound. But the interest today is mainly in the fourdrinier machine. So we study the fourdrinier.

The stock from which facial is made, and the manipulation of the machine by the skilled operator are greater factors in the production of a satisfactory product than the exact details of the machine. But there must be built into the machine which is to make facial tissue the possibility of changing its combinations, and these create the special requirements for such a machine.

At the consistencies at which facial is made, the question of proper mixing, either ahead of an open pond, or when the stock is pumped to a hydraulic pressure inlet, must be carefully considered. Successful operation of hydraulic pressure inlets makes it unlikely that the open pond of the tremendous height necessary for the slice opening pressure would be installed at a speed like 1,500 fpm. However, where the merchandising and investment problem of the individual manufacturer warrants more moderate speeds, approach flow boxes will deaerate the stock satisfactorily and prevent the formation of concentrations of fiber. The head on a pump supplying the hydraulic pressure inlet should be great enough to prevent the pump from taking air.

The type of the slice is the next consideration. There are offered to the trade at least two types of the nozzle slice. The hydraulic design of the slice is a matter of major importance in the manufacture of

No Limit!



Possibilities for the profitable application of electric motor-drive to production processes of many kinds today are almost without limit. Reliance engineering experience has proved that electric motors, instead of being merely convenient and economical sources of power, can be made to do many things which formerly called for complicated mechanical hook-ups and controls. Moreover, they are doing the work better, more economically and with improvement in the quality of the finished product.

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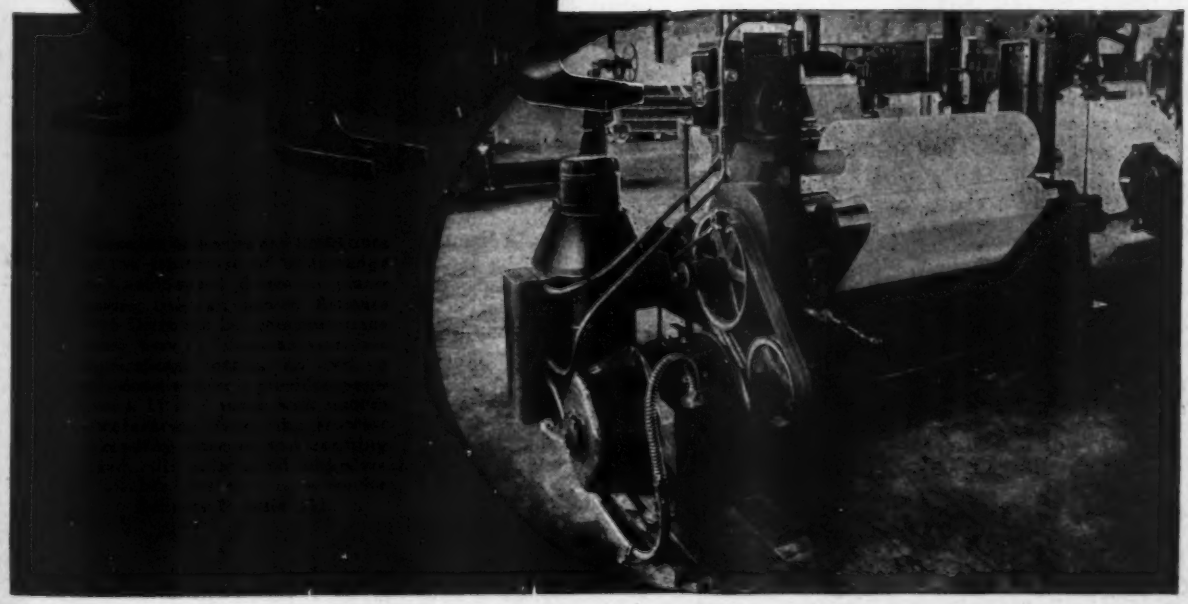


facial. However, facial is made at moderately high speeds, like 900 ft. to a thousand, with quite ordinary standard high pressure inlets.

The location of this nozzle ahead of the center line of the breast roll, and the relation of the line of direction of the jet emerging from the nozzle to the plane of the wire are matters for speculation. Perhaps a design of inlet nozzle adjustable in section and also adjustable in location in respect both to the plane of the wire and to the center line of the breast roll is desirable at high machine speeds and consequent high nozzle discharge velocities.

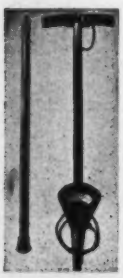
Even with a high speed of discharge at the nozzle to provide intermingling currents to continue the formation of the sheet some distance down the wire table, the perforated or distributed roll, especially in a pressure slice, its direction of rotation and its speed of rotation are matters for speculation. Direction of rotation and speed may be determined by each papermaker for himself with a variable drive and by reversing the motor.

The length of the wire is a matter for speculation. It is believed that the nozzle discharge on recent machines forces so much of the water through the wire near the breast roll that a long forming table is not necessary. This naturally shortens the wire.

I know of no facial machines which use a shake. Perhaps some facial manufacturer believes that one is desirable. It hardly seems likely, but the matter should not be overlooked.

ARE YOU PROUD OF YOUR PAPER?

It is hard to maintain quality standards today, with many of your experienced men called away to service, and often new pulps and substitute chemicals with which to work. It requires most systematic care in paper making. We suggest as an important first step the routine use of the Cambridge Surface Pyrometer for checking roll temperatures in the drying roll train. Proper progressive temperatures here will go a long way in preventing spots, cockle, curl and blisters.



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The Cambridge is made in a hand model and with the extension attachment to reach those hard-to-get-at places.

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CAMBRIDGE
SURFACE PYROMETERS

Is a making board of any use?

Toilet tissue machines are using fewer and fewer table rolls. How many should there be on the facial machine? There are offered to the trade the dandy roll type of table roll and the fin roll. Are either or both of these suitable for the facial machine, and what should their requirements be—the diameters and the mesh of wire cloth in the case of the dandy type?

Where should the table rolls be located—the first roll after the breast roll and the spacing of subsequent rolls? With the slotted type of table roll support rail, the papermaker has an opportunity to determine this for himself.

What should be the pitch of the table roll support rails? Should the wire plane pitch downhill from the breast roll to the guide roll—or should it be level or even uphill? Would the need of each operator to determine this for himself in relation to his pulp supply and preparation make a fourdrinier table adjustable in slope a warranted expense?

How many suction boxes are really necessary? How many would it be necessary to provide space for?

Is there any special type of suction box, cover, or vacuum control better suited to facial, or is this question a matter of ordinary papermaking?

The couch press, if improperly designed can, on an ordinary tissue machine, cause a good deal of grief. Assuming that it is designed structurally for operation at the required maximum speed, are there any special characteristics which a facial machine requires? Is the rubber top roll necessary or desirable? What should the plasticity be? Are there other special requirements for facial? Should the bottom roll have any special specifications? If the offset of the top roll is adjustable, should the roll be offset toward or away from the breast roll?

How many presses should there be? If two, should these both be suction presses, or only one, or neither? Or should there be only one press—presumably suction?

Is there anything to be said about the type of top roll in any one of these cases?

Is there anything to be said about the length of the bottom felt for each press?

What should be the method of cleaning and conditioning the top felt? It is assumed that the bottom felt is cleaned in the usual way with the device the individual papermaker prefers. Handling the top felt produces serious difference of opinion. We have been told that it shouldn't be cleaned too clean; and that it must be cleaned as much as possible. One papermaker requires a device for raising the nap, and another can't get his machine up to speed until the nap is pretty well worn off. We differentiate, therefore, between the cleaning of the felt and the conditioning of the felt.

How big must the Yankee dryer be to get the maximum required speed? This is not entirely dependent on the dryer itself, or the pressure which is used in it, but depends on the aid to drying supplied by the design of the hood.

The pressure roll is a matter for consideration. Should its diameter be selected only for structural reasons? Is there a pressure diameter in relation to the dryer diameter which has its effect on the width of the nip; and does this have any special requirement when making facial? Assuming that the pressure roll is rubber, what is the most desirable plasticity? Is there any special reason for locating it in one place or another aside from getting the most drying space on the dryer?

Some mills do not use tail rolls. Should there be one or not?

Is there a requirement for a special creping doctor for facial? Or can this be settled by general papermaking rules? Is there any special angle? Presumably the cleaning doctor should be oscillated? Does facial require otherwise?

Should there be a sort of breaker stack or set of pre-calenders? What should be the material of these rolls? Are both chilled iron, or is one rubber and one chilled iron?

The effect of spreader bars in combination with the effect of the creping doctor and the per cent of crepe comes in to question? Are they a necessity for controlling softness? Or is this done with the per cent of crepe and the manipulation of the sheet in the calenders?

The calenders themselves may, it seems, have two rolls or three. These rolls may be either all chilled iron, or one rubber and one chilled iron, or one rubber and two chilled iron. What is preferable?

The reel seems to be just a reel. In general, it does not have to be too heavy, and evenness of reeling within fairly broad limits is not too fine a point.

In mills making facial at speeds up to and including a thousand feet, there is a variety of ideas about winders. Some of them are remarkable and all interesting. In some mills, the reel is taken to a converting department without any winding after the machine.

Two or more unwinding stands are likely to be required. Some facial tissue manufacturers put as many as three sheets together. And some of these do it after the machine, putting two or three sheets through a set of calenders. These calenders, it is claimed, soften the sheet, and press together the two or three sheets being wound to facilitate conversion.

The slitters vary from score cut slitters against a solid roll, through a saw cut in a slot, to a plain saw cut. Shear cut slitters seem to be out of the question.

The actual reeling device can be of the shaft winder type or of a modified two drum winder type.

No reference has been made here to structural items on which there are ordinary papermaking requirements. These include the design of felt rolls, wire rolls and the actual structural design of frames. Nor has the drive been touched on, including the required per cent of crepe.

This paper has been written to outline the items on a facial tissue machine which should be thought over very carefully by an intelligent purchaser and a competent machine manufacturer. The answers to most of the problems, or adjustable designs leading to the answers, are not beyond the scope of such a combination.

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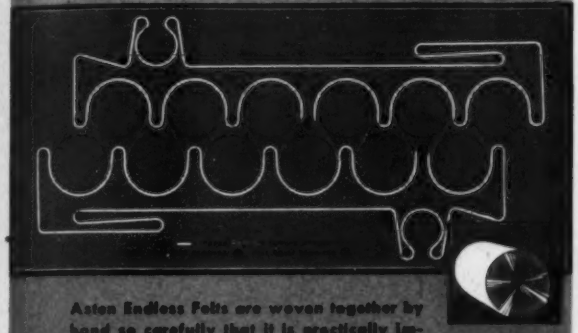
FOR ANY STANDARD PAPER MACHINE



Asten Endless Felts are woven together by hand so carefully that it is practically impossible to detect where the ends are joined, and so securely, that it is impossible for them to pull apart in service. Installation is made by pulling one looped end over the dryers, removing the felt rolls that are inside the felt, and replacing them again, one by one, as the felt is pulled in place. Illustration at the right shows how they are rolled for shipment, with a core in each looped end of the felt. . . . Asten Felts can be joined with any type of seam you are accustomed to using. . . . We have recently published a 28 page book illustrating and describing various types of dryer felt seams.

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WHEN you're looking for ways to ease today's "Help Wanted" problem, it will pay to check into your stuffing boxes or steam fits. They demand a lot of care and attention—for inspecting, servicing and, too frequently, for replacing parts worn rapidly by misalignment.

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For today's big task these production boosting benefits of the Johnson Joint are of first importance. Don't overlook, however, the savings in dollars and cents—in reduced maintenance and longer life—which can quickly pay the cost of change-over. Make that your final reason for joining the hundreds of Johnson Joint users.

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• Nipple (1) fastened to roll. Sliding collar (2) keyed to nipple. Carbon graphite seal ring (3) and bearing ring (4) which eliminate oiling and packing. Spring (5) is for initial seating only; joint is actually pressure sealed when in operation.

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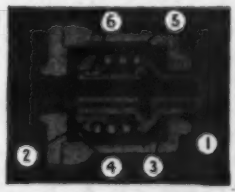

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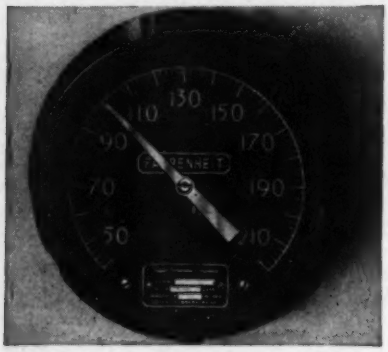
The Johnson Corporation
840 WOOD STREET THREE RIVERS, MICH.

NEW EQUIPMENT AND SUPPLIES

Dial Thermometer

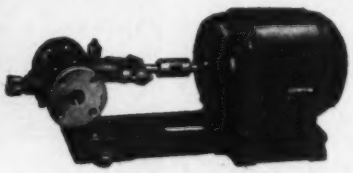
A mercury-actuated metal dial thermometer with 4½ in. phenolic case has been announced by Taylor Instrument Companies, Rochester 1, N. Y. Designated as



53 K series, this thermometer is available in the following Fahrenheit temperature ranges: 40 to 120, 40 to 220, 350 to 550, 400 to 900, –10 to 110, 80 to 300, 300 to 750, 30 to 150, 50 to 400, 200 to 900.

New Line of Rotary Pumps

Goulds Pumps, Inc., Seneca Falls, N. Y., has announced a line of rotary pumps of the double helical or herringbone gear type. The pumps, designed to handle liquids possessing inherent lubricating qualities, are available in ten sizes. The sizes range from a unit with a ½ in. suction and discharge and with a capacity of from one to one and one-half gpm to a two and one-half inch unit with capacity ranging from 50 to 75 gpm. Maximum working pressures in all sizes is given as 75 lb.; and all sizes are obtain-

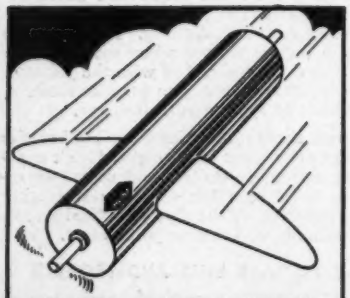


able for direct drive through flexible coupling or for belt drive.

Features of the line include simplicity of construction involving only two moving parts, a split bolted type gland, renewable bearings and relief valve.

The driven gear is of bronze; the driving gear, of steel. Bearings are of high lead bronze and are fitted with grease lubricators. The relief valve, built into the pump cover and externally adjustable, is of the stainless steel ball type.

In addition to the standard fitted units, all pumps are available with all parts of iron or steel or in all bronze construction.



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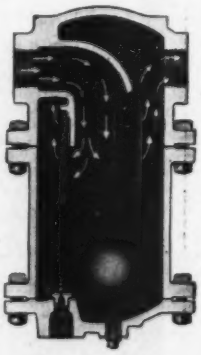
Self-Draining Compressed Air Separator

A compressed air separator with a complete float trap mechanism built within it has been developed by the Johnson Corporation, Three Rivers, Mich. In the operation of this separator, which is known as Type SA, the entering air is first allowed to expand slightly, thereby precipitating most of the entrained moisture. Then the air passes through a labyrinth of coarse wire mesh to change its direction of flow abruptly many times, thereby surrendering the remaining particles of foreign matter.



All of the moisture that has been removed from the compressed air drops to the bottom of the separator. When the level of the accumulated liquid is sufficient to raise the float, the trap valve opens and the liquid drains from the separator.

The separator is available in capacities of 80 or 160 cubic feet of free air per minute at 90 lb. pressure. The smaller size has inlets of ¾, 1, or 1¼ in.; the larger has inlets of 1½ or 2 in.

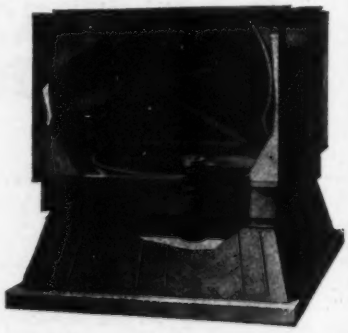
New Line of Rotameters

A new line of rotameters, designated as Series R-100, has been announced by Cochrane Corporation, 17th St. at Allegheny Ave., Philadelphia 32, Pa. The meters covered by the line are of the indicating area meter type with both free and guided floats. Sizes range from ⅛ in. to 3 in. Floats may be viscosity or density compensated. Metering tubes are of extra heavy wall Pyrex borosilicate glass. Features include: spring stop floats to prevent damage to float by sudden surges of liquid; high pressure stuffing boxes, permitting use of corrosive liquids under high operating pressures; single external adjustment of stuffing boxes by wrench; white-backed metering tube for easy reading; interchangeable calibration scales; constant tension guide rod anchored in ends of glass tube; and, for test work, guide rod can be supplied with spring loading feature to secure precision of alignment.

Power Roof Ventilator

The Powermatic Ventilator Company, 4019 Prospect Avenue, Cleveland, Ohio, has announced a new model of its *Iron Lung* ventilator.

Of square design, the new unit is built in three easily assembled sections—the base, the chassis (which contains the completely assembled power unit), and the head. The power unit is accessible from

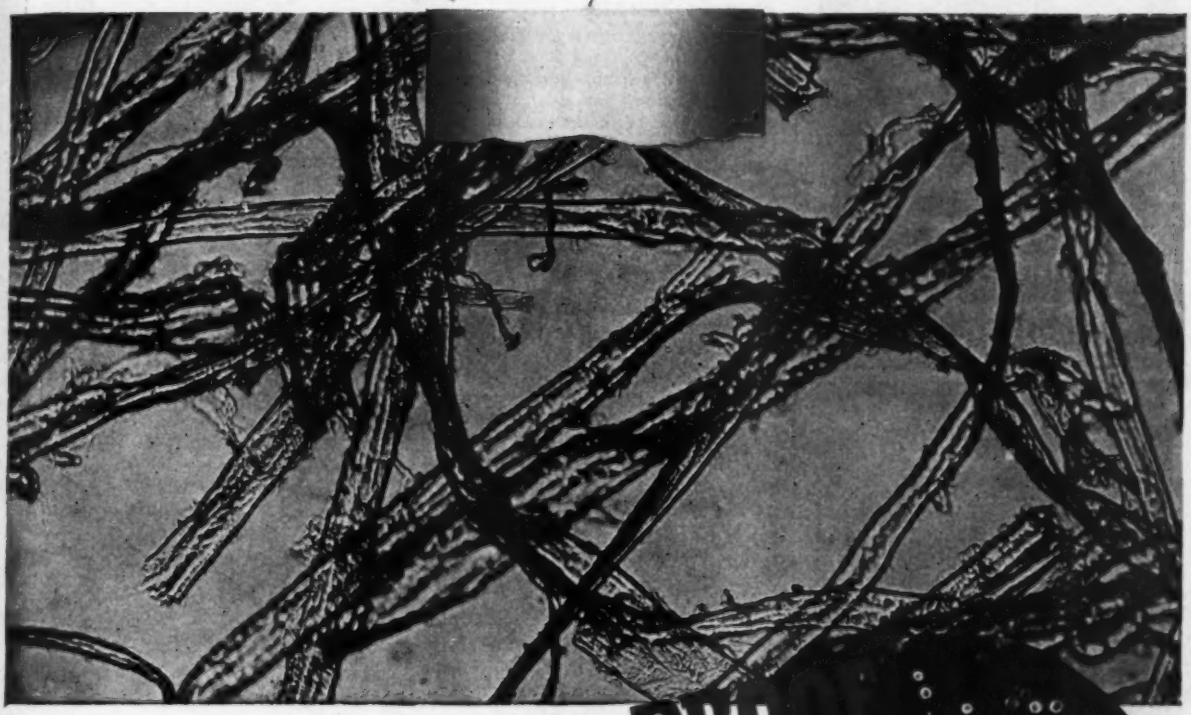


above for any maintenance or repair operations. Air foil dampers open automatically when power is turned on—close automatically when power is "off." Dampers are equipped with quick-detachable, self-cleaning hinges which requires no oil or grease and cannot freeze.

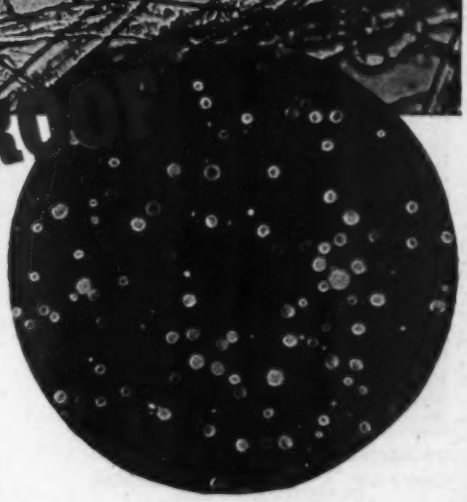
The ventilator is available in sizes from 20 in. to 60 in., using motors of from ¼ to 10 hp., and with exhaust capacities ranging from 3500 to 60,000 cu. ft. per minute.

According to the manufacturer, this ventilator will operate efficiently in any kind of weather regardless of wind direc-

This represents a 500 magnification of a human hair



HERE'S VISUAL PR



The Paracol* Wax Emulsions virtually eliminate the danger of wax spots.

These actual photomicrographs (x500) of pulp fibers and of a Paracol emulsion show clearly their relative size, as well as the uniformity of the tiny wax particles. Hundreds of them would be needed to coat a single fiber . . . thousands of them to cover a human hair . . . many times more than that to form a wax spot.

The Paracols are everything that emulsions should be . . . uniform . . . stable . . . easy to use. And there are more than 50 different Paracols from which to choose the one best suited to your problem. For further information on the use of Paracols in your operations, mail the handy coupon.

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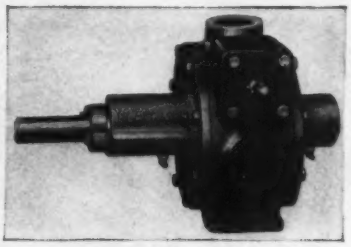
tion or velocity, and deliver the exhaust so high above the roof that it will not return through open doors, windows, or idle ventilators.

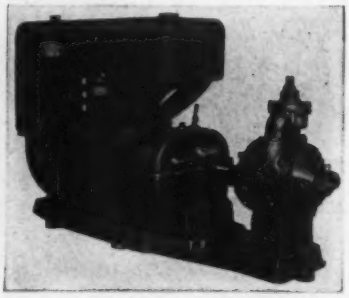
Three Pump Developments

Recent announcements of the Blackmer Pump Company, Grand Rapids 9, Mich., cover three new pump developments—one a 35 gpm truck pump; another, a 300 gpm pump powered by a 25 hp. Diesel engine; and the third, a line of special vane rotary pumps.



35 gpm truck pump

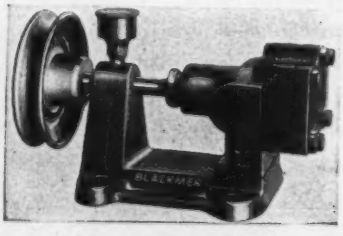
The truck pump is compact and light in weight making it suitable for mounting on small trucks. It is designed for standard power-take-off drive and has a capacity of 35 gpm at 525 rpm. Its normal operating pressure is 45 psi. A relief valve, built into the pump casing, will by-pass the entire capacity of the pump. Suction and discharge connections are tapped for 1½ in. pipe.



Pump for oil sludge

The Diesel engine-operated pump, designed for handling oil sludge, is fitted with steam jacketed heads to lower the viscosity of the pumpage. The engine speed is 1200 rpm, reducing through a double reduction, oil-immersed drive to 300 rpm on the pump shaft. The discharge pressure of the pump is 25 psi.

The special vane type rotary pumps are made in capacities ranging from 2/3 gpm to 10 gpm. They are furnished with base and flexible coupling for direct connection to prime mover, for "V" or flat belt drive and with special design brackets to meet mounting specifications of customer. Both all iron, bronze fitted or all bronze constructions are available.



Small capacity rotary pump

Due to bucket design, these pumps are self-adjusting for wear, maintaining normal capacity throughout the life of the buckets, which are replaceable when worn out.

Liquid Resin of Improved Odor

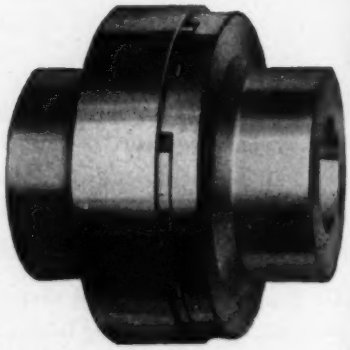
A liquid resin of improved odor, Nevillac OA, has been introduced by The Neville Company, Pittsburgh, Pa. Average physical properties of this product are: specific gravity @ 30/15.6 C, 0.960 to 1.00; viscosity (Gardner-Holdt) @ 25 C, W (average); distillation by volume, essentially between 300 and 375 C (maximum per cent off @ 300 C, 5%); refractive index @ 20 C, 1.5355; odor, sweet, characteristic; color, pale amber; and color retention, good.

The resin is soluble in almost all organic liquids except water and glycols. It is completely compatible with most synthetic resins, including cellulose esters, and ethers, vinyl acetate, vinyl butyral, zein, coumarone-indene resins, etc., and partly compatible with polyvinychloride and vinyl acetate and chloride copolymer.

Among other uses, the manufacturer suggests this resin as a coating for waterproof and greaseproof papers and for ordnance wrap.

Shrouded Flexible Coupling

Lovejoy Flexible Coupling Company, 5009 West Lake St., Chicago 44, has announced the L-R Type "C" shrouded flexible coupling. Designed for heavy duty services (from 4.60 hp to 806 hp at 100 rpm), this clutch features an outside steel collar for holding the load cushions in place. An extension of the collar shield conceals the heads of the bolts that secure the load cushion retainer.



Cushions are made of various materials to meet the needs of the particular service. They are always in sight. In operation, half of them are idlers (except on reversing load).

The clutch is available in types for directly attaching to flywheel or for rapid disassembly without disturbing drive or driven equipment.

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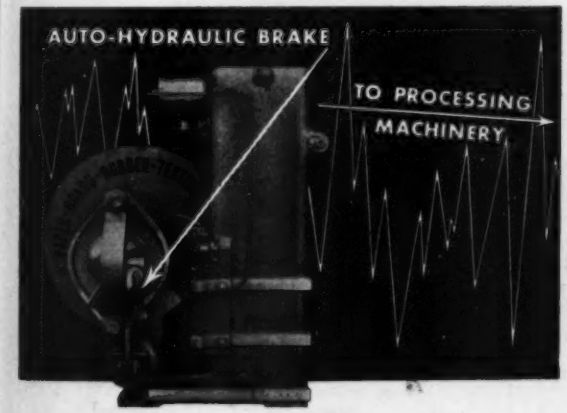

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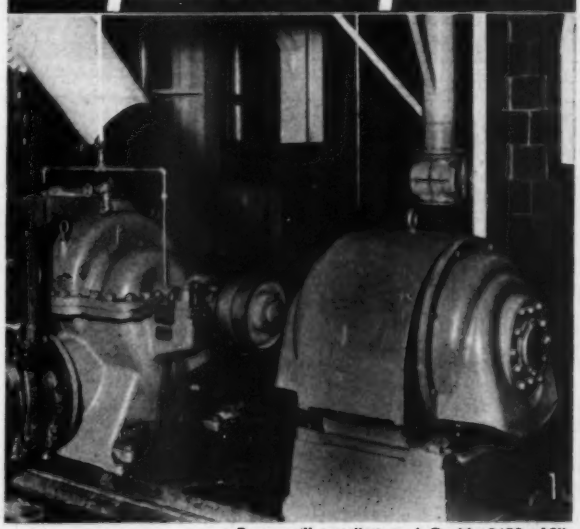

Paper mill installation of Goulds 3450—16" Double Suction Centrifugal for white water.

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TECHNICAL DEVELOPMENTS

These abstracts are of the latest developments found in the American and foreign press.

Straw, as a Source of Paper Pulp

Although this a lecture, the article contains some new data, which are summarized in 4 graphs and 5 tables. After making a series of laboratory cooks on rye straw, at 50 and 80 C., the author undertook some mill kraft cooks (the exact conditions of which are not described, but which gave yields of about 60%). The resulting pulp, while not as strong as a sulphite (wood) pulp, may be used in admixture with the latter in manufacturing spinning paper. Data are given in the appended table ("yellow" straw pulp, "chlorite" straw pulp—prepared according to Jayme—and sulphite pulp being included for comparative purposes).

The comparative yields of softwoods, hardwoods, and of straw (as well as other raw materials) per unit area (per annum) are discussed, together with the problems of transportation. The author also gives chemical analyses of rye straw, and of pulps obtained therefrom under various conditions. Fritz Stöckigt. Papier-Fabr. Wochbl. Papierfabr. (1943) No. 8, 303-8.

Straw as a Source of Paper Pulp

	Yellow Straw Pulp	Jayme Straw Pulp	Sulphate Straw Pulps		Sulphite Wood Pulp for spinning paper).
Degree of Beating	50	50	50	50	50
Time of Beating (mins.)	10	....	35	20	12
Tearing Length (meters)	4200	7200	6900	7890	7282
Per Cent Elongation	1.26	4.3	2.7	3.7	5.66
Number of folds	7	760	2040	2636	7320
Elmendorf test	24	37	56	63	84
Per Cent Yield	70	48	64	60	Not given

Paper-cores for Construction Work

The author alludes to the "Dur-I-Cell" system for fire-proof construction in prefabricated houses. Chemically treated paper cores made of corrugated or solid fiber board may be covered with various kinds of cement (or other self-hardening materials) to give demountable, cellular roof, wall, or floor units. The system may also be used in airplane parts, pontoons, ship construction, etc. Frank Betty. Converter 18, No. 5, 22-23 (May, 1944) through B.I.P.C. 14, 310 (1944).

Effect of Writing Inks on Paper Strength

Several different types of writing paper were subjected to ink treatment, and were then "aged" by keeping them in contact with an air current for 100 hours at 80 deg. C. The papers used were a fine rag, a satisfactory 100 per cent chemical pulp-containing paper, and a rather mediocre paper containing a 50-50 mixture of chemical and mechanical pulp. The first of these papers was very well sized. The second one was satisfactorily sized, whereas the last one was a doubtful specimen. The inks used included 7 iron-gallate inks, 5 inks containing synthetic dyestuffs, and 2 inks made from logwood. The dye-containing inks (with the exception of one of the logwood inks) had very little effect on the strength properties of the paper. On the other hand one of the logwood inks and *all* the iron inks caused marked lower-

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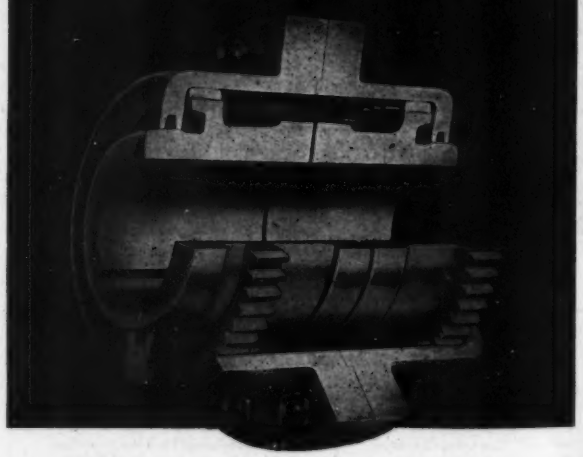

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ing of the folding endurance, although breaking length, elongation and pop test remained practically unaffected. Tear-through also remained virtually unchanged, except in the case of the rag paper.

Usually it was the high grade rag paper which showed the greatest loss in strength due to the ink treatment and aging. The all-chemical pulp paper came next, and the strength properties of the mediocre paper were those least affected. Inasmuch as the folding endurance is correlated with permanence, the use of iron-gallate inks on fine writing papers may actually cause deterioration. W. Brecht and E. Liebert. Papier-Fabr. Wochbl. Papierfabr. (1943), 330-34.

Physical and Chemical Factors in Stereotyping

The various steps in the stereotyping process are given with special reference to the chemistry and physics involved. The "flong" or stereotyping mats are usually made up of layers of paper and paste. Whereas their use is usually practical and cheap, other plastic materials may be used in their place. Moisture has a marked influence on the properties of paper flong, and there appears to be a range above which and below which the moisture content leads to undesirable results. The best way to store flong is in a properly designed conditioning box. During the baking of the mold, a certain amount of shrinkage cannot be avoided. This can be reduced by allowing the flong to dry out on the form. Because of the partial elastic recovery when the pressure in the mold is removed, there is always some loss of detail and depth. Sharpness of certain impressions is also lost. The article is a plea for further research on alternative materials for mold and cast. G. W. Harrison, PatraJ. 7, No. 1, 4-11 (1943). Through B. I. P. C. 14, 18 (1943).

Wettability and Absorptivity of Pulp and Paper

In determining the "wetting time" of a pulp sample, the author uses the method of Dalén, which may be outlined as follows: Three pulp sheets are allowed to remain in distilled water for one hour at 20 C. They are removed and permitted to dry (in the absence of heat or of direct sunlight for 30-36 hours) and are finally placed in a humidity room at 65 R.H. for five hours, at 20 C. In the case of each of the three sheets, ten determinations are made (for each side of the sheet). The "Dalén buret" is placed 2 cm. above the test sample and filled with 0.1% methylene blue solution. One drop of this solution is permitted to impinge on the sample, and a stop-watch record is made of the seconds elapsing between the release of the drop and the disappearance of the resultant shiny "mirror" from the surface of the sheet.

The test is sharply reproducible. The actual time of penetration was determined in a simple apparatus designed by the author. Essentially it is cell or bath with an overflow, and containing four supports of equal dimensions (for the equipment holding the test sheets) and adequate space for a carbon electrode. A sufficient number of circular pulp or paper samples are used to insure an average weight of 500 grams per square meter. The sheets are piled and clamped securely between two perforated zinc plates by means of two closely fitting outer rings constricted so as to prevent endwise leaks.

During the test, the lower zinc plate rests horizontally on the supports, and is connected with the negative pole of an indicating (or recording) voltmeter. The upper zinc plate is connected both with the carbon electrode (submerged in the electrolyte) and with the positive pole of the voltmeter. The voltmeter shows an initial rise until a maximum is reached. Subsequently, after a time interval (which may be accurately measured), there is a sharp and sudden decrease in voltage. This time interval is a measure of the time of penetration (as opposed to surface wetting). The number of seconds found in this determination is conveniently recomputed to seconds per 100 grams per square meter (i.e. about 1/5 the time consumed in the actual test). The further advantages of a recording voltmeter are discussed as well as the modifications in connecting the instrument when an external source of A.C. and a transformer are used. The original article gives an illustration showing the apparatus. The author also outlines the use and limitations of measuring absorption heights, etc. Konrad Agahd. Papier-Fabr. Wochbl. Papierfabr. (1943), No. 8, 302-3.

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PAPERMAKING PATENTS

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Inquiries should be addressed to James Atkins, Munsey Building, Washington 4, D. C.

Paper Sizing Material

Patent No. 2,326,849. George B. Fowler and Donald K. Pattilloch, Springfield, Mass.; said Patilloch assignor to Chemical Development, Inc., Chicago, Ill., a corporation of Illinois. No drawing. Application September 27, 1941. Serial No. 412,691. 9 Claims. (Cl. 106—80). 1. A precipitable sizing material comprising a mixture of substantial quantities each of starch, rosin and an alkali silicate from the group consisting of metasilicate and sesquisilicate.

Drier Drum

Patent No. 2,328,321. Earl E. Berry, Beloit, Wis., assignor to Beloit Iron Works, Beloit, Wis., a corporation of Wisconsin. Application July 31, 1939. Serial No. 287,507. 7 Claims. (Cl. 34—9). 5. A drier drum comprising a cast bronze hollow cylinder having a highly polished peripheral surface, concave cast bronze heads secured to the ends of said cylinder and having central apertures therethrough, a hollow ferrous metal trunnion extending through said cylinder and having enlarged rim portions force-fitted in said apertures, shoulders adjacent said rim portions, bolts springing said heads outwardly against said shoulders, a dividing wall in said trunnion, steam jets on one side of said dividing wall communicating with the interior of the trunnion and the cylinder, means for introducing the steam to said steam jets, steam condensate drain lines extending into said cylinder from said trunnion on the opposite side of the dividing wall whereby radial and axial stresses are relieved when steam is introduced into the drum to heat the cylinder due to the higher rate of expansion of said bronze material members over said ferrous metal trunnion.

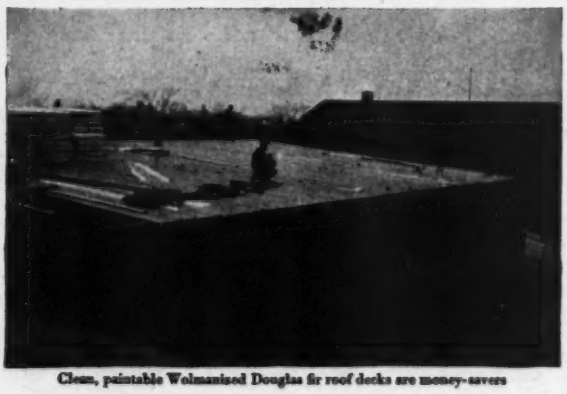
6. The method of making machine glazed paper which comprises contacting wet paper with the highly polished bronze surface of a heated, fine grained bronze drum, and vaporizing the moisture in said paper at a rapid rate without blowing the paper off said surface.

Papermaking Apparatus

Patent No. 2,321,830. William M. Leeson, Glens Falls, N. Y., assignor to The Sandy Hill Iron & Brass Works, Hudson Falls, N. Y., a corporation of New York. Application January 23, 1940. Serial No. 315,267. 2 Claims. (Cl. 92—43). 1. The combination in paper-making apparatus of, a vat having front, rear and side walls and a curving wall between the lower portions of the side walls, brackets on the upper sides of the side walls, members movable up and down on said brackets and means for moving the same, rods with upper ends pivotally connected to said members having lower free ends, journal means at the free ends of said rods, a cylinder journalled at opposite ends in said journal means, and means connected to said journal means for swinging said rods and cylinder back and forth relative to said curving wall.

Coating of Paper

Patent No. 2,321,244. Francis G. Rawling, Piedmont, W. Va., assignor to West Virginia Pulp and Paper Company, New York, N. Y., a corporation of Delaware. Application March 13, 1940. Serial No. 323,680. 2 Claims. (Cl. 117—65). 1. In the art of coating paper and the like with a coating composition comprising an aqueous suspension of mineral pigments and an adhesive by the use of an applicator roll to which said aqueous suspension is continuously fed and by which said composition is spread out into a film upon the paper undergoing coating by the aid of a cooperating roll between which and said applicator roll the paper is squeezed, the method of preventing splitting of the applied coating film and adherence thereof to the applicator roll after said coating has been applied to the paper, which consists in incorporating into said coating composition an oleaginous



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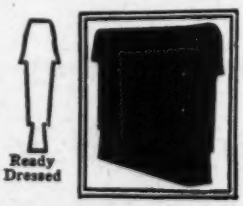

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emulsion having an oil and water phase and containing a hydrocarbon oil, a fatty acid, a soap, and starch, which emulsion is breakable by the physical rubbing incident to the coating operation above described, whereby in said operation a portion of the oil phase adheres to said applicator roll as an oil film thereby causing an adherence to said applicator roll of a water film derived from the surface of the coating material applied to the paper, whereby the coating material is caused to adhere to the paper and not to the applicator roll.

High-Wet-Strength Paper

Patent No. 2,325,302. Kenneth W. Britt, Norwood, Pa., assignor to Scott Paper Company, Chester, Pa., a corporation of Pennsylvania. No drawing. Application November 3, 1938. Serial No. 238,693. 8 Claims. (Cl. 117—155). 1. A high-wet-strength paper containing from approximately .5 of 1% to 5% on the basis of the dry weight of the paper, of a resin formed by reacting a urea and an aldehyde only, said aldehyde being a saturated aliphatic aldehyde having from 1 to 4 carbon atoms and said resin being in substantially cured condition.

Method of Making Coated Laminated Paper

Patent No. 2,325,584. Philip S. Barnhart, Westfield, Mass., assignor to Westfield River Paper Company, Inc., Russell, Mass., a corporation of Massachusetts. Original application February 1, 1937. Serial No. 123,334. Divided and this application February 2, 1940. Serial No. 316,909. 4 Claims. (Cl. 154—40). 2. A method of making a substantially transparent coated laminated product, comprising uniting sheets of glassine paper with a binder comprising at least 40% wax which binder is fused and rendered effective by heat at an elevated temperature, thereafter applying an outer coating of thermoplastic composition containing a volatile solvent to the laminated paper, and then drying the coated paper at a temperature lower than that which previously fused the binder and which will cause no separation of the laminated sheets of paper.

Coated Paper

Patent No. 2,319,957. John K. Speicher, Newark, Del., assignor to Hercules Powder Company, Wilmington, Del., a corporation of Delaware. No drawing. Application September 11, 1941. Serial No. 410,437. 6 Claims. (Cl. 117—157). 1. A cellulosic sheet material carrying a wax-like, moisture-resistant, scuff-resistant, nontacky surface coating, applied thereto without substantial impregnation thereof, of a fused composition having a melting point within the range of about 70° C. to about 150° C. and consisting of a wax and ethyl cellulose, the percentage of ethyl cellulose being in excess of 10% by weight but not more than 50%, and the percentage of wax being at least 50% by weight and less than 90% by weight, the ethoxyl content of the said ethyl cellulose being in the range from about 40% to about 55%.

Device for Distribution of Stock on the Wire Parts of Papermaking Machines

Patent No. 2,329,799. Kristen Andreas Thorsen, Grenoble, Isere, France; vested in the Alien Property Custodian. Application January 8, 1940. Serial No. 312,989. In Great Britain January 9, 1939. 12 Claims. (Cl. 92—44). 1. A paper making machine comprising in combination means to feed a stream of paper pulp under pressure, an outlet nozzle or slice predetermining the cross-sectional area of said stream, a woven wire conveyor, a curved plate bridging a space between said nozzle or slice and said wire conveyor and means to adjust the length of path of said stream of paper pulp on said curved plate.

Paper Laminating Machine

Patent No. 2,330,530. John N. Tuttle, Philadelphia, Pa., assignor to The Glassine Paper Company, West Conshohocken, Pa., a corporation of Delaware. Application August 12, 1939. Serial No. 289,740. 10 Claims. (Cl. 154—37). 1. An apparatus for laminating webs of paper or the like comprising a metal roller, means for driving said metal roller, and a resilient roller arranged to press together and against said metal roller a plurality of said webs having adhesive between them, said resilient roller being rotatable solely under the action of said webs and during its rotation being locally compressed, thereby constituting a load upon said driving means applied through said webs.

New Catalogues and Publications

Allis-Chalmers, Milwaukee 1, Wisconsin.—In a new quick-picture bulletin just released by this company, it reviews the five special kinds of Allis-Chalmers Texrope V-belts, as well as the new type Magic-Grip Sheave and the four speed changing methods used in the sheave. Ask for bulletin No. B6331.

American Standards Association, 29 W. 39th Street, New York 18, N. Y.—A supplement to the American Standard, Socket Set Screws and Socket Head Cap Screws, (B18.3,—1936) No. B18.3a—1944, gives dimensions of stripper bolts in eight nominal sizes, ranging from ¼ to 1¼ inches. It may be obtained by addressing the American Standards Association and sending 10 cents for mailing.

J. J. Berliner & Staff, 212 Fifth Avenue, New York 10, N. Y.—Chemical executives will be interested in the Berliner Chemical Surveys issued by this company listing its latest chemical surveys compiled by a staff of research experts. Copy will be sent free on request.

Cleveland Worm and Gear Company, Cleveland, Ohio.—A catalogue with a complete exposition of their fan cooled worm gear reduction units by means of cutaway photographs, charts, diagrams and engineering tables has been issued by this company. Also included are instructions for planning installations of Speedaire units, with illustrative examples. Rating tables and information on dimensions and shipping weights are given. Ask for Catalogue No. 300.

Detrex Corporation, Detroit 27, Michigan.—Two informative cleaning booklets have been released by this company. "Solvent Degreasing and Effective Methods of Conserving Chlorinated Solvents" is a 16-page booklet which emphasizes fundamental practices for the economical use of degreasing solvents in metal cleaning departments of industrial plants and describes typical designs of degreasers. "Detrex Triad Alkali Cleaners" is an 8-page booklet describing in detail alkali and emulsion cleaning compounds developed by Detrex for all types of metal cleaning jobs.

The Farval Corporation, 3295 E. 80th Street, Cleveland 4, Ohio.—The theory and practice of mechanical lubrication is presented graphically in a three-color 16-page booklet. Cutaway drawings in color are used to explain how the Farval measuring valve operates to deliver a measured amount of lubricant, and why it can do this without recourse to springs, check valves or small ports. Similar treatment is also given to the construction and operation of both manual and automatic pumping units. The economics of positive mechanical lubrication are illustrated in the center spread. The booklet is concluded with a selection of 24 application photographs, suggesting methods of locating and mounting pumping units and feed lines on as many different kinds of machinery. Ask for Bulletin No. 25.

The B. F. Goodrich Company, Akron, Ohio.—A booklet obtainable on request from the above company reproduces an address by J. E. Powers, manager of the truck and bus tire department, given before the Pennsylvania Motor Truck Association. Mr. Powers analyzes the truck tire situation now and in the immediate future, and also discusses the quality and service of synthetic truck tires.

In a new 44-page handbook on industrial fractional horsepower V-belt drives published by this company, the trend toward larger sheaves in both fractional horsepower and multiple V-belt drives is noted. It also describes the construction of the fractional horsepower V-belts and gives prices and data on both sheaves and belts. Additional valuable material is a chapter on proper selection of FHP belt drives, with formulas. Horsepower ratings and general engineering data of these drives are given, as well as selection tables of stock drives. Copy free on request.

Lyon-Raymond Corporation, 1534 Madison Avenue, Greene, N. Y.—This company will mail on request Bulletin No. 135, "Die Handling Made Easy," which describes its line of die handling trucks, as well as its portable hydraulic elevating table. Illustrations show various designs of equipment to take care of different problems.

Paisley Products, Incorporated, 1770 Canalport Avenue, Chicago 16, Ill.—Industrial plants and war contractors interested in the solution of fabricating and packaging adhesive problems, in connection with new operations or the packaging of war materials for export, should obtain a copy of the "Adhesive Problem Data Sheet," just adopted by the above company. By listing the required facts and information for the adhesive chemist, the selection of an adhesive can be narrowed to a fine point, which will result in higher standards of performance, lower costs and saving of time. Write direct to the company for this questionnaire.

Policyholders Service Bureau, Metropolitan Life Ins. Company, 1 Madison Avenue, New York 10, New York.—A special study of the new worker during wartime is the subject of a new report entitled "Orienting the New Worker." This study treats of all phases of orientation and will be most helpful to all executives concerned with the hiring and induction of employees. Copies will be sent to executives when requested on their business stationery.

Preferred Utilities Manufacturing Corporation, 1860 Broadway, New York, N. Y.—This company is offering an at-

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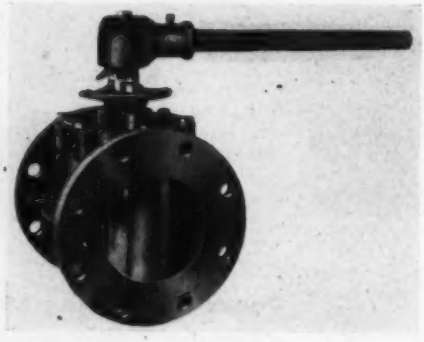

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tractive booklet, "New Approaches to Surface Protection." It will be of special interest to engineers and executives who are faced with new and unfamiliar problems in heat resistance. A series of graphs show the relative reflectance values of different colors found in refractories and other heat-resisting surfaces.

Books

Chemical Machinery—Written as an elementary treatise on equipment for the process industries, this book, by Emil Raymond Riegel, Professor of Industrial Chemistry, University of Buffalo, totals nearly 600 pages. Dr. Riegel states in the preface to the volume that the material contained within it was obtained directly from the manufacturers, in conversations with the engineers in charge, or by correspondence, supplemented by visits to shops and chemical plants, and by study of manufacturers' catalogues, booklets of instruction, and the general literature. The book contains 27 chapters. They cover, in part, such subjects as Factors in Plant Location; Devices for Reducing the Size of Solid Materials; Screening and Grading Equipment; Conveying and Elevating Equipment; Tanks; Devices for Propelling and Elevating Liquids; Mixing, Kneading and Blending Equipment; Separation of Solids from Liquids; Evaporators, Crystallizers, and Dryers; Heat Exchangers; and Instruments. Published by Reinhold Publishing Corporation, 330 West 42nd Street, New York, N. Y., the book is priced at $5.00 a copy.

The Oxy-Acetylene Handbook—A 600-page manual on oxy-acetylene welding and cutting procedures, this book is conveniently divided into seven parts: namely, General Principles of Oxy-Acetylene Process, Oxy-Acetylene Welding of Ferrous Alloys, Oxy-Acetylene Welding of Non-Ferrous Alloys, Miscellaneous Applications, Oxy-Acetylene Cutting, Inspection and Management, and Appendices. The first six parts of the book are further divided into 40 chapters; the last part, into Welding and Cutting Data, and The Air Acetylene Flame and Its Uses. The book is a how-to-do-it publication for engineers, designers, superintendents, welding operators and others who may be interested in the welding subject. The price is $1.50 a copy; the publisher, The Linde Air Products Co., 30 East 42nd St., New York 17, N. Y.

Packaging Catalog—The 1944 edition of this publication, a veritable encyclopedia on the subject, is keyed to the theme of reconversion. All of the wartime progress in packaging, including the many new uses of paper, the new protective wraps and coatings developed for global warfare, the new shipping packages and devices—all are consolidated into this latest edition. The first section of the Catalog is devoted to the subject of reconversion in all of its ramifications. There is an article by a WPB official outlining a time-table for the reconversion of various materials to peacetime uses. As an introduction to the sectionalized data, there are eleven articles on subjects treating of reconversion, each by an authority on his subject.

The new Catalog is 9" x 12" and contains 750 pages (more than 100 pages over last year's edition). It is casebound in tan leatherette. The printing, layout, and color work are exceptional, and the sections are marked by index tabs. The price is $2.50 per copy; foreign, $3.50. The Catalog is published by 1944 Packaging Catalog, 122 East 42nd Street, New York 17, N. Y.

Wear, A Discussion of the Mechanism of Wear Phenomena and Influencing Factors—Written by D. Landau, Industrial Applications Engineer, The Nitralloy Corporation, this 46 page booklet takes up such subjects as: The Mechanism of Wear; Wear and Physical Properties; Surface Melting; Molecular Adhesion; Specific Pressures; Galling, Pitting, Scoring; Fretting; Chemical Effects; Wear Testing; Wear In and Wear Out; and Cause of Difference in Rate of Wear. A rather extensive bibliography completes the booklet. The Nitralloy Corporation, 230 Park Ave., New York 17, N. Y., is its publisher.

Wood Chemistry—Edited by Louis E. Wise, this book is the work of 14 authors: Harry P. Brown, Carl C. Forsaith, William M. Harlow, W. O. Hisey, and Edwin C. Jahn, each of the faculty of the New York State College of Forestry; Richard D. Freeman of Dow Chemical Corporation; L. F. Hawley and Alfred J. Stamm, each of the Forest Products Laboratory; Ervin F. Kurth, Major, U. S. Army (formerly of the staff of the Institute of Paper Chemistry); Hermann Mark of Brooklyn Polytechnic Institute; A. G. Norman of Iowa State College; Max Phillips of the Bureau of Agricultural Chemistry and Engineering (U. S.); Selman A. Waksman of the New Jersey State Experiment Agricultural Station and Rutgers University; and Louis E. Wise of The Institute of Paper Chemistry.

It is a volume of 900 pages which is conveniently arranged in six parts and which in turn are divided into 25 chapters. The six major parts of the book cover The Growth, Anatomy, and Physical Properties of Wood; Components and Chemistry of the Cell Wall; The Extraneous Substances; Surface Properties of Cellulosic Materials; The Chemical Analysis of Wood; and Wood as an Industrial Raw Material. Published as No. 97 of the Monograph Series of American Chemical Society, this book, as expressed in its preface, is more than an expansion of Monograph 28, *The Chemistry of Wood*, by Dr. Hawley and Dr. Wise that was published in 1926. Priced at $11.50 a copy, the book has been published by Reinhold Publishing Corporation, 330 West 42nd Street, New York, N. Y.

CURRENT MARKET QUOTATIONS

RAGS (Domestic)

NEW RAGS

OPA ceiling prices in sales to consuming mills delivered buyer's usual receiving point, with brokers' allowance not in excess of 5 per cent.

	per cwt.
Blue Overalls	-5.50
Corduroy, Men's	-3.50
Corduroy, Ladies'	-3.00
Washables, No. 1	-3.00
Percales	-4.75
New Soft Blacks	-3.75
Light Prints, No. 1	-4.50
Khaki Cuttings—	
Bleachable	-4.25
Unbleachable	-3.50
New White Canvas	-6.50
New Mixed Blacks	-3.25
Canton Flannels, Bleached	-7.00
Shirt Cuttings—	
New White No. 1	-7.25
No. 1 White Headings	-7.25
White Shrunk	-6.00
Flannel No. 1	-6.75
New Unbleached	-7.50
Fancy	-3.50
Linen Cuttings—	
American	-5.00
White	-14.00
Gray	-14.00

RAGS (Domestic)

f. o. b. New York City

OLD RAGS

OPA ceiling prices in sales to consuming mills f. o. b. cars at points of shipment, with brokers' allowances of $1 to $2 a ton depending on the value of the grade involved.

Roofing—	per ton
No. 1	31.00
No. 2	29.00
No. 3 and No. 4	27.00
Twos and Blues—	
Repacked	44.00
Thirds and Blues—	
Repacked	44.00
Miscellaneous	36.00
Whites, No. 1—	
Repacked	76.00
Miscellaneous	64.00
Whites, No. 2—	
Repacked	58.00
Miscellaneous	53.00

RAGS (Foreign)

ex dock New York City

NEW RAGS — per cwt. — Nominal

New Dark Cuttings
New Mixed Cuttings
New Light Silesias
Light Flannelettes
Unbleached Cuttings
New White Cuttings
New Light Oxfords
New Light Prints

RAGS (Foreign)

ex dock New York City

OLD RAGS — per cwt. — Nominal

No. 1 White Linens
No. 2 White Linens
No. 3 White Linens
No. 4 White Linens
No. 1 White Cottons
No. 2 White Cottons
No. 3 White Cottons
No. 4 White Cottons
Extra Light Prints
Ord. Light Prints
Med. Light Prints
Dutch Blue Cottons
French Blue Cottons
French Blue Linens
Checks and Blues
Linsey Garments
Dark Cottons
Old Shoppers

ROPE and BAGGING

f. o. b. and ex dock New York City

Gunny No. 1—	per cwt.
Foreign	Nominal
Domestic	2.50 to 2.75
Wool Tares—	per cwt.
Light	2.75 to 3.00
Heavy	3.00 to 3.25
No. 1 Scrap Bagging	2.50 to 2.75
Manila Rope—	
No. 1 large	-*115.00
No. 1 small	-*105.00
Sisal Rope—	
No. 1 large	-*95.00
No. 1 small	-*80.00
New Burlap Cuttings	5.50 to 6.00
Jute Threads—	
Foreign (Nom.)	6.25 to 6.75
Domestic	5.50 to 6.00
Strings—	
No. 1 sisal	-*80.00
No. 2 sisal	-*60.00
Soft jute	5.00 to 5.50
Mixed	1.50 to 1.75

*OPA ceiling price per ton f. o. b. shipping point.

WASTE PAPER

OPA ceiling prices f. o. b. points of shipment for machine compressed bales weighing not less than 500 pounds (with differential of $5 per ton less for loose or bundled stock), and brokers' allowance of 4 to 9 per cent.

Shavings—	per ton
White Env. Cuts, One-Cut	67.50-
Hard White Env. Cuts	62.50-
Hard White, No. 1	57.50-
Soft White, No. 1	50.00-
Soft White, One-Cut	57.50-
Soft White, Misc.	42.00-
Fly Leaf, No. 1	33.50-
Fly Leaf, Woody, No. 1	25.00-
No. 2 Mixed Col. Woody	18.00-
Flat Stock—	
No. 1 Heavy Books and Magazines	38.50-
Mixed Books	22.00-
Ledger Stock—	
No. 1 White	46.00-
No. 1 Mixed (Colored)	40.00-
Manilas—	
New Env. Cuttings	53.00-
New Env. Cuts, One-Cut	57.50-
Extra Manilas	39.00-
Manila Tab Cards, Free of Ground Wood	45.00-
Ground Wood Manila Tab Cards	27.00-
Kraft—	
Envelope Cuttings	65.00-
Mixed Env. or Bag Cuts	55.00-
Tripled Sorted No. 1 Brown	50.00-
New 100% Cor. Cuts	45.00-
No. 1 Old Assorted	35.00-
News—	
White Blank	33.00-
Overissue	22.00-
No. 1 Baled	20.00-
Old Corrugated Containers	28.00-
New Corrugated Cuts	18.00-
Mill Wrappers	22.00-
Box Board Chips	14.50-
No. 1 Mixed Paper	19.00-

CHEMICALS

f. o. b. shipping point

Alum (Papermakers)—	
Lump, cwt.	4.25-
Ground, cwt.	4.00-
Powdered, cwt.	4.40-
Blanc Fixe—	
Pulp, bulk, ton	40.00 to 46.50
Dry, barrels, pound	60.00 to -
Bleaching Powder—	
Drums, cwt.	2.25 to 3.10
Casein (Domestic Standard)—	
20-30 mesh (bags), lb.	24.00 to 24.75
80-100 mesh (bags), lb.	—
Argentine, lb.	18.50 to 20.50
China Clay—	
Domestic Filler Bulk (mine) ton	7.50 to 15.00
Domestic Coating Bulk (mine) ton	11.00 to 22.00
Imported (ship side) Bulk (lump) ton	14.00 to 26.00
Chlorine—	
Tank cars (wks) cwt.	2.00 to 2.25
Gelatine (silesia), lb.	.90 to .95
Glue, (C.P.) drums, lb.	18.25 to 18.75
Litharge, powd., bbl., lb.	.09 to -
Rosin (Gum)—	
New York, per 100 lbs.	
E	6.34-
F	6.58-
G	6.45-
WW	6.99-
Rosin (Wood), carlots	4.18-
Salt Cake—	
Dom. bulk (wks) ton	15.00 to 16.00
Imp. bulks on dock— (Atl. ports) ton (Nom.)	20.00 to
Soda Ash—	
Bulk (works), cwt.	.90 to .95
Paper Bags, cwt.	1.05 to 1.25
Barrels, cwt.	1.05 to 1.35
Soda (Caustic)—	
Solid, drums, cwt.	2.30 -
Ground and flaks, drums, cwt.	2.70 -
Sodium Silicate—	
60 deg., 55 gal. drums, (works) cwt.	1.65 to 2.05
40 deg., 35 gal. drums, (works) cwt.	.80 to 1.45
Starch—	
Pearl, 140 lb. bags, cwt.	3.72-
Pearl, barrels, cwt.	3.83-
Paper (Sp.) bags, cwt.	3.83-
barrels, cwt.	3.93-
Sulphur (crude)— (mine) bulk, long ton	16.00 to ——
Talc—	
Dom. 100 lb. bags (mine) ton	16.00 to 21.00
Imp. bulk, ton (Nom.)	—
Titanium Dioxide—	
Barium Pig., bbls., lb.	.05¾ to .06
Calcium Pig., bbls., lb.	.05 to .05¾
Zinc Sulphide, bbls., lb.	5.60 to 5.85

WOOD PULP

OPA maximum prices applicable to wood pulp delivered to consumer mills located East of the Continental Divide exclusive of Denver, Colo. (West of the Continental Divide and in Denver, Colo., ceilings are $6 per ton lower):

Bleached softwood sulphite	86.00
Unbleached softwood sulphite	74.00
Bleached hardwood sulphite	83.50
Unbleached hardwood sulphite	71.50
Northern bleached sulphate	86.00
Southern bleached sulphate	79.00
Northern semi-bleached sulphate	82.00
Southern semi-bleached sulphate	75.00
Northern unbleached sulphate	73.00
Southern unbleached sulphate	63.50
Bleached soda	72.00
Unbleached soda	68.00
Ground wood pulp	50.00
Ground wood—paper machine dried and mutilated	53.00
Sulphite screenings	43.50
Sulphate screenings	38.00
Ground wood screenings	32.00
Northern unbleached sulphate slidrums	73.00
Southern unbleached sulphate slidrums	63.50
Standard news print slidrums	50.00

PAPER

f. o. b. New York City

Boards—	per ton
Binders	84.00-
Chip	48.00-
Chip, tube and can	50.00-
Chip, full-bending	52.50-
Chip, spl. mla. Reed	60.00-
Coated, white patent .016	80.00-
.020 and heavier	75.00-
Kraft liner	63.00-
News	48.00-

Book Papers—OPA base maximum prices per cwt. 4 cases or equivalent, f. o. b. mill with quantity, weight, manufacturing and other differentials allowed:

Uncoated (Untrimmed)

Book, White (M. F.)—	
A Grade E. F.	8.25
B Grade E. F.	7.80
C Grade E. F.	7.55
D Grade E. F.	7.30
E Grade E. F.	7.05
No. 2 Uncoated Offset 4 sides. White	8.45
Coated White (Trimmed 4 sides)	
No. 1 Glossy	11.90
No. 2 Glossy	10.85
No. 3 Glossy	10.15
No. 4 Glossy	9.80
No. 5 Glossy	9.30
C2S Offset	10.40
C1S Litho (Varnish)	10.05
C1S Litho (Non-Varnish)	9.80

Writing Papers—OPA base maximum prices per cwt. on writing papers, f. o. b. mill with sone, quantity, packing and other differentials allowed:

Rag Content Bond—	per cwt. 20 lb.	16 lb.
Extra 100% Rag	34.00	34.00
100% Rag	28.00	28.00
75% Rag	20.00	20.00
50% Rag	16.00	17.25
25% Rag	14.00	15.00

Rag Content Ledger—	per cwt. Zone 1
Extra 100% Rag	35.00
100% Rag	29.00
85% Rag	26.00
75% Rag	21.00
50% Rag	17.00
25% Rag	15.00

Sulphite Bond—	per cwt. 20 lb.	16 lb.
Air dry, watermarked	12.75	13.70
No. 1 (M. F.) watermarked	9.00	9.70
No. 2 (M. F.) watermarked	8.25	8.85
Plain (M. F.) unwatermarked	7.60	8.20

Sulphite Ledger—	per cwt. Zone 1
No 1 (M. F.) watermarked	10.00
No. 2 (M. F.) watermarked	9.25
Plain (M. F.) unwatermarked	8.60

Glassine (f. o. b. mill)—	per cwt.
Embossed (25 lb. up)	13.75 to 14.25
Bleached (25 lb. up)	12.75 to 13.25
Unbleach. (25 lb. up)	11.50 to 12.00
Greaseproof—	
Bleach. (25 lb. up)	11.00 to 11.50
Unbleach. (25 lb. up)	10.00 to 10.50

News—OPA Ceilings	per ton
Rolls, Standard (Contract)	58.00
Rolls, Lightweight (Cont.)	62.00
Rolls (Spot)	(nominal)
Sheets	66.00

Tissues (Carlots)—	per ream
White, No. 1	1.12½ to 1.30
White, No. 2	1.00-
Bleached Anti-Tarnish	1.15-
Colored	—
Anti-Tarnish Kraft	.70-
Manila	.90 to .95
Napkins, semi-crepe (12½ lb. to M shts.) per cs.	.60-
Napkins, full crepe and emb'sed (12½ lb. to M shts.) per cs.	.60-
Toilet, Bleached (M shts.) per cs.	5.65-
Toilet, Unbleached (M shts.) per cs.	4.25-

Towels—	per cases
Bleached	3.20 to 3.75
Unbleached	2.80 to 3.05

Wrappings (Kraft)—	per cwt.
Super-Standard	5.25 to 7.65
No. 1 Wrapping	5.00 to 7.40
Standard Wrapping	4.75 to 7.15
Standard Bag	4.37½-

Wrappings (Sulphite and Bleached Kraft)— (Rolls, f. o. b. mill)

Bleached papers— M.F. & M.G. Waxing, 30 lb. (Carloads only)	per cwt. 7.25 to 7.80
(10,000 lbs.)	7.50 to 7.75
Drug wrapp. 35 lb.	7.00 to 7.35
Unbleached Papers—	
Com. Grd. Butch. 40 lb.	5.50 to 5.75
No. 1 Butchers	5.75 to 6.00
No. 1 Imit. Parch & Dry Fin. Groe. Sulphite 30 lb.	6.25 to 6.50
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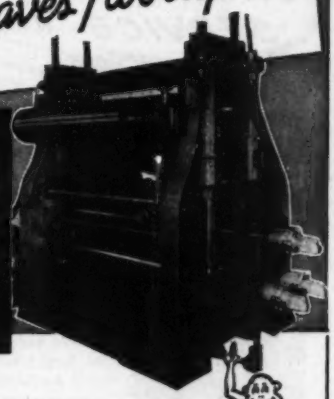

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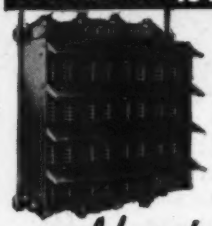

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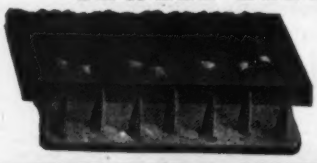

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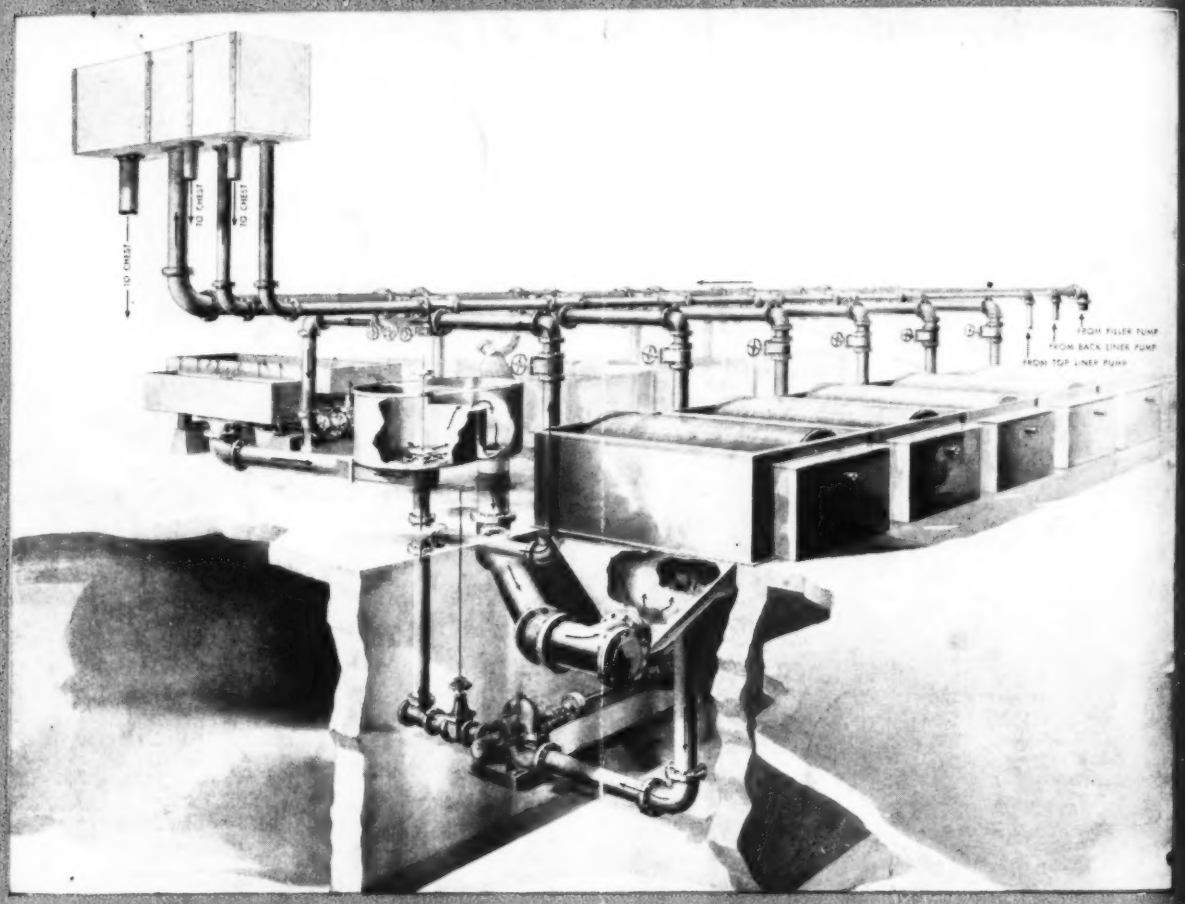

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